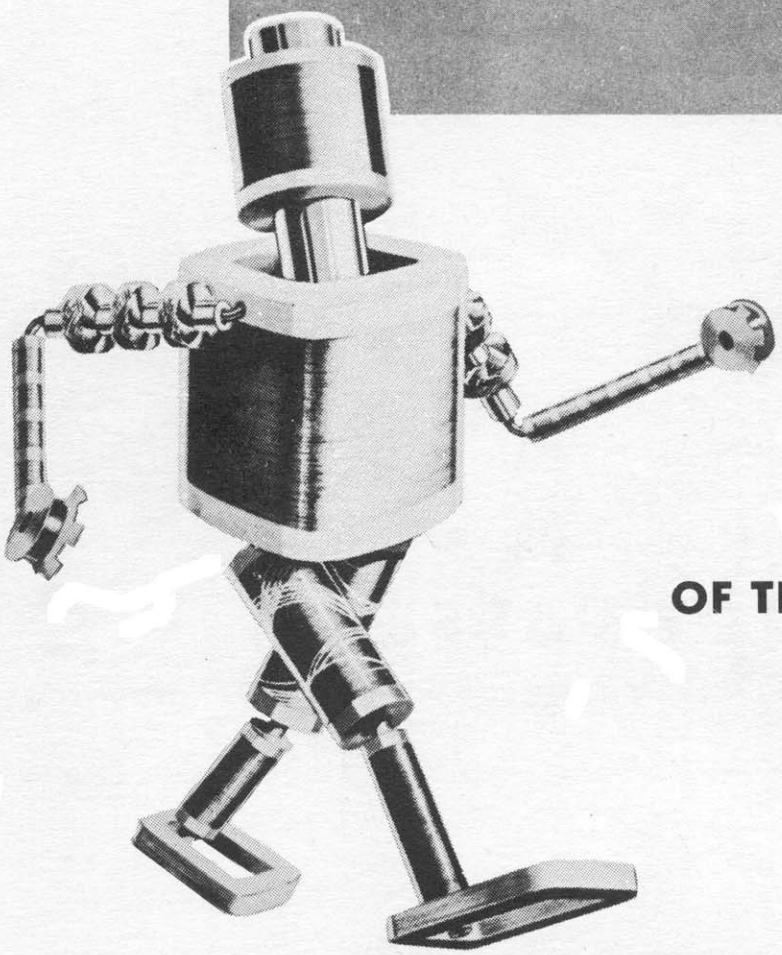
GETTING THE MOST FROM COIL WINDING



A REPRINT

OF THE FIRST 40 ISSUES

IN THIS SERIES

LEESONA®

UNIVERSAL WINDING COMPANY

P. O. Box 1605, Providence 1, R. I.

New Over-End Tension Speeds Start

(No. 102 Winding Machine)

A new method of wire delivery has been developed to permit drawing the wire from over the end of the wire spool instead of unrolling the supply. By eliminating the unrolling feature, the "Insto-Start" Over-End Tension overcomes the problem of spool inertia at the start of the winding, increases operator production and improves quality of work.

With this attachment, winding can be started at top speed. There is no need for the operator to "coax" the spindle while inertia is being overcome. The operator goes on to the next coil without delay.

Unlike existing types of over-end tensions, control of the wire on the "Insto-Start" is made possible through the medium of a compensator.

In the tension control, the wire passes around a tensioning wheel (B) with a rubber covered groove and over a compensator (C). Tension is regulated and maintained by a steel strap which is actuated by the compensator to give tightly wound, uniform coils and to permit duplication of tension settings through inbuilt calibration features. Coil handling and wire anchoring are facilitated by the compensator which takes up the slack in the wire while these operations are going on.

Besides the tension itself, the attachment consists of open, ring-type balloon guards with supports, and supply shelf for the wire spools.

The two guards (A) keep the wire under control as it balloons out from the spool. They are large enough to permit quick and easy threading of the wire when replacing spools. They may be quickly adjusted vertically for different sizes of wire and rates of take-up.

The "Insto-Start" Over-End Tension accommodates any wire size from No. 42 to No. 23 B & S. It has been designed primarily for use on the No. 102 Universal Coil Winding Machine but is adaptable to other makes as well.

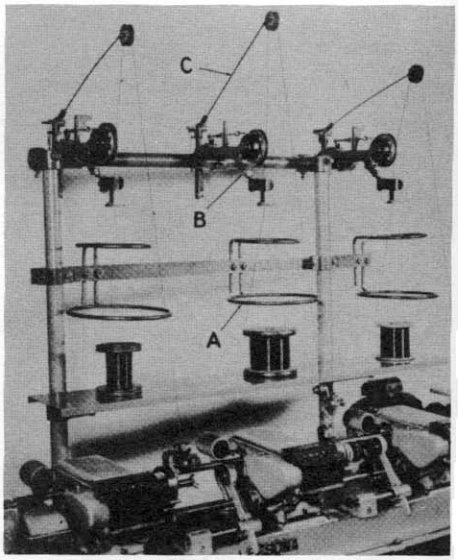
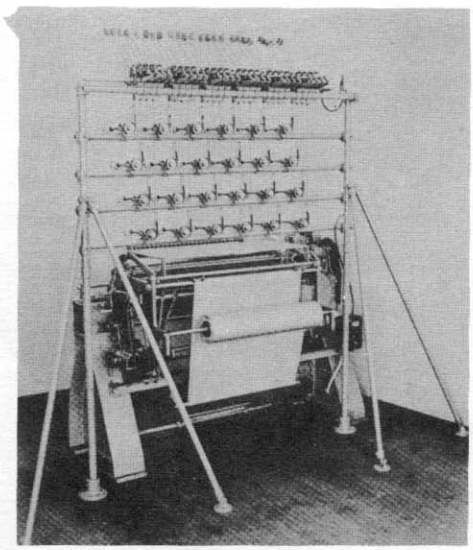


Fig. 1 New "Insto-Start" Over-End Tension applied to No. 102 Universal Coil Winding Machine.

CARE OF PAPER

in winding paper-insulated coils on Nos. 104 and 107 machines



The start of good winding is having the paper in good condition.

One of the most important essentials in the winding of paper-insulated coils is to have the paper in good condition. In a large majority of cases, difficulty in winding can be traced back to the paper.

The first requisite is to guard against changes in relative humidity. When the waterproof wrapper is removed, the roll of paper takes on or loses moisture content in accordance with the difference in this relative humidity; and when that happens, wrinkling occurs.

As the paper leaves the factory in its waterproof wrapper it contains about 6½ to 7% moisture, which keeps it in equilibrium with air at 45 to 50% relative humidity. For best results the coil winding area should be kept within that range.

Rolls should not be unwrapped

until just before using. If a partly used roll is to be put away and not used for a while, it should be rewrapped and stored either in the same area or in one having the same relative humidity.

Folds or bends in the paper are to be avoided. The roll should be stored on its end. If it lies on its side, it may be pushed out of shape, which causes trouble later in the winding operation.

Overnight the paper in the feeding mechanism becomes "set" by the bars and rolls around which it passes. Therefore, before starting the machine in the morning, several yards of paper should be pulled off and thrown away.

Sometimes paper that has become wrinkled by excess moisture must be used in order to save the paper or because no other is available. The wrinkles can be straightened out with some success by mounting a lamp over the roll while it is on the machine. A 200-watt lamp may be used, though infra-red is better. The heat from the lamp then dries the outside layer and penetrates through the inside as well. The heat should be left on until the imperfections disappear. Some manufacturers prefer to keep the lamp in operation at all times regardless of room conditions.

If the paper is right, the coil winding operation is off to a good start.

HOW TO ANCHOR LEADS

It's a simple job when coils are wound individually, but rather tricky when producing in stick form. Four commonly used methods are described here.

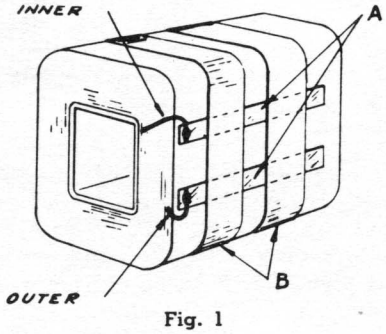


Fig. 1

This method is used primarily for coils of fine wire. Inner and outer leads are enclosed in sleeving and are soldered to tinned flat terminal strips (A). These strips are anchored to the surface of the coil by means of adhesive tapes (B).

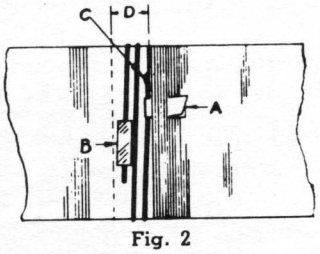


Fig. 2

When the terminal is soldered to the initial wire turn while in the winding machine, this method is used. The terminal is soldered at (C) and held in place by a loop of adhesive tape at (A). This loop is firmly anchored in place by subsequent wire turns. The loose terminal is wrapped around the coil in the space (D), representing the extension of insulating paper beyond the end of the coil. During winding the end of the terminal is held temporarily in place by a sticker at (B). After coils have been cut to length, the end of lead at (B) is extracted by tweezers or a small hooked instrument. (This same method is used on heavy wires not requiring a separate terminal or lead.)

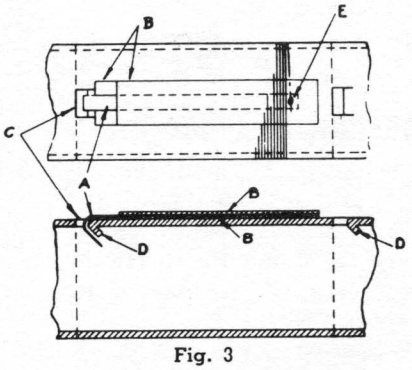


Fig. 3

Tinned flat strips for leads (A) are sometimes fully insulated underneath and overhead by varnished cambric strips (B), the first turn of wire generally being soldered to this strip at (E). To keep the projecting strip and its insulation out of the way during winding, and to allow cutting the finished coil stick without injury to this strip, the paper coil-tube is punched as shown at (C). The lap at (D) is folded down so the projecting lead and insulation can locate in the shallow channel inside of the winding arbor.

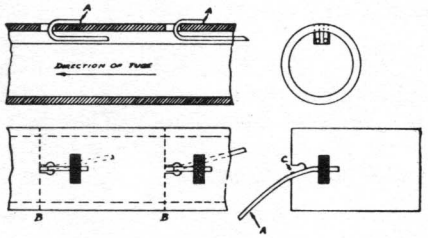


Fig. 4

For braided leads as used on ignition coils, a method similar to the one just described is used. However, a keyhole-shaped punching is employed with leads (A) projecting through to lie in a grooved channel in the winding arbor during the winding. After the coils are cut apart at (B) and the initial lead (A) extracted, this lead can be worked across the corner at (C), so that the lead will be located on the outside surface of the tube.

SOME TYPES OF COILS present more difficult conditions. In many instances we have been able to suggest satisfactory methods, and will be glad to co-operate with you on request.

New Wire Retainer Simplifies Removing Finished Coils and Starting New Coils

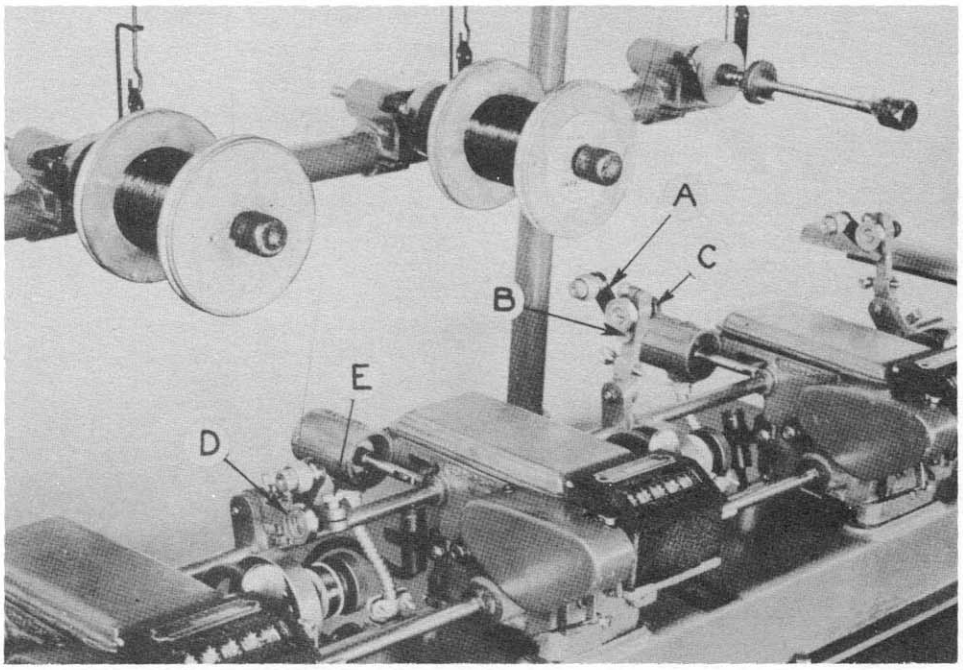
The process of removing finished coils and starting new ones on the No. 102 Universal Coil Winder has been greatly simplified by the development of a new Wire Retainer.

This Retainer, added to the Wire Guide Holder, provides a mechanical means for keeping the wire in a more accessible position while changing coils.

It is designed to grip the wire while it is being cut and while the finished coil is being exchanged for a new one. The end of wire is conveniently at hand ready to fasten to the new coil, and the operator is saved the trouble of reaching for the wire and having to guide it over the compensator wheel.

The device consists of a mounting plate with a stud having a rounded polished surface and a knurled sleeve which is rounded and polished on the side facing the stud. It is between these two polished surfaces that the wire is gripped when the Wire Guide Holder is raised.

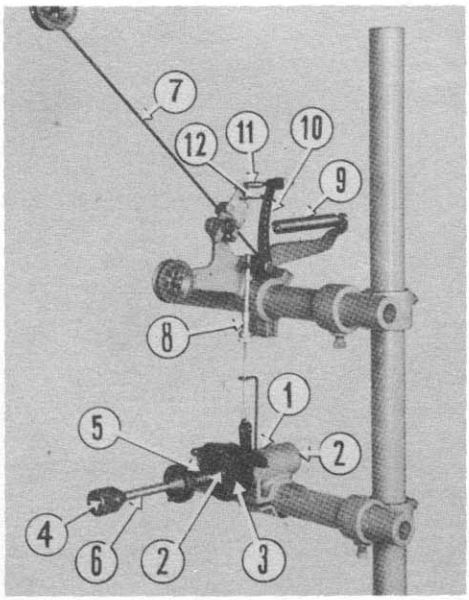
The mounting plate (A) is attached at the left hand side of the Wire Guide Holder by passing the plain locating pin through a hole (B) in the Holder. Then the Wire Guide Adjusting Screw (C) is screwed through the Holder from the right-hand side, passing through the plate. The Wire Guide (D) is attached by means of the Wire Guide Screw.



Turning the Adjusting Screw moves both the Wire Guide and Retainer sideways a short distance to centralize the Guide over the coil, and a lock screw (E) prevents this Wire Guide from getting out of adjustment.

The polished surfaces of the Stud and Sleeve are held directly in line with the groove of the Wire Guide. When the Wire Guide is lowered into the winding position, the wire is clear of the Retainer. After the coil is wound and the Wire Guide Holder is raised, the Retainer is brought into contact with the wire which enters between the rounded surfaces and there is gripped firmly. The wire is then cut, the coil removed and a new coil form installed, with the end of wire accessible for fastening to the new form.

This new Wire Retainer and Adjusting Screw can be easily installed on all standard No. 102 Wire Guide Holders (No. 102-305) now in use, since there has been no change in the Wire Guide Holder itself.



Strap Tension for No. 105 Universal Coil Winder.

STRAP TENSIONS

LOCATION OF SPOOL

Wire spools should be located as close as possible to the spindle bearing (1) in order to reduce vibration and wear to a minimum. However, our field men report that in many instances the spools are too far from the bearings.

To locate the spool in its proper position, the following procedure should be followed:

Loosen the supply spindle collars (2) and brake wheel (3).

Place the spool on the spindle followed by the outer cone (4).

Press the spindle backward in the bearing until the spring (5) is compressed 1/8 in. and tighten the collars and brake wheel (3). The rear collar should not bind against the ball bearing; there should be no backlash.

Tighten the screw in the brake wheel snugly into the "V" groove of the spindle (6). (Otherwise the brake wheel will rotate slightly on the spindle and cause the wire to slacken when stopping.)

COMPENSATOR

The position of the compensator (7) during winding is a good indication of the correctness of the tension setting. When the settings have been properly made, the compensator should remain in a nearly horizontal position with very little oscillation—never more than 1 in. above or below horizontal. If the compensator runs too high, tighten the brake connecting rod adjuster (8) slightly; if too low, loosen the adjuster.

The two kinds of compensators (7) and the three kinds of tension springs (9) that are provided should be used only for a definite wire range.

Wire Range	Compensator	Tension Spring
#19 to #28	Heavy	Heavy
#29 to #35	Light	Medium
#36 to #42	Light	Light

TENSION

Varying amounts of tension can be obtained by moving the spring to any one of the eight holes in the tension adjusting lever (10).

A slight adjustment of the compensator plate adjusting spring (11) may help to smooth out the operation, but it must be remembered that the tension adjusting lever link (12) operates the brake mechanism. Therefore, the action of this adjusting spring should never be strong enough to render the link inoperative.

When the tension is properly adjusted, the wire spool will rotate at a uniform speed without sudden or intermittent checking, and the compensator will move with only a slight up-and-down stroke.

CLEANING

Sometimes, after considerable use, the face of the brake wheel may become gummed, causing it to turn in an erratic manner. Before making any adjustments, the brake wheel should be cleaned with gasoline to determine if this condition is causing the trouble. A light film of machine oil on the surface is sometimes helpful.

SHORT CUTS IN COIL HANDLING PROCEDURE

We design Universal Coil Winders to produce at as high a speed as is practicable and to wind as many coils at a time as possible.

The efficiency, however, is restricted to the time that the machines are in actual operation, and the manual work involved is another matter. The attaching of leads, for example, is time-consuming and reduces the machine output. Therefore, any saving in handling time increases the machine output.

The following suggestions may be helpful to you in shortening the time for manual operations.

LEAD ATTACHING

Where the coil specifications require leads or terminals at the finish of a completed coil and also at the beginning of a new coil, the work is usually performed as two separate operations.

However, time can be saved if, at the finish of a coil, the operator will remove two or three inches of insulation from the wire and twist a lead at each end of the cleared section. This permits cutting the wire off close to each lead and preparing both leads simultaneously, which, in time, means quicker resumption of winding. (See Fig. 1.)

Fig. 1. Two leads twisted at each end of the cleared section of wire.

SLEEVING

When winding "double" coils (that is, coils having two equal wire sections) and where it is necessary to utilize a piece of cotton sleeving with the connecting wire between the two sections, it is usually necessary to cut the wire at the end of the first coil section, apply the sleeving, and then solder the wire for the second coil.

Fig. 2. Cotton sleeving on wire when winding double coils.

This operation can be simplified by placing this sleeving over the wire at the beginning of the first coil section and having the operator hold this sleeving while all of the wire slides through it to the completion of the coil.

This means that at the end of the first coil section, the sleeving is already in place and there is no need of breaking the wire before starting the second section. (See Fig. 2.)

On automatic machines or where more than one pair of coils are being wound at a time, it is possible to utilize a clip, which can readily be made in your tool room. This clip, attached to the wire guide will hold the sleeving in place, allowing the wire to slide through until the first section of the coil is wound. The sleeving is then released and put into position, after which the second section can be wound. (See Fig. 3.)

SUPPLY OF GUMMED TAPE

The finishing of coils and the anchoring of final wire turns can be speeded up considerably if the gummed tape (required) is made available in a form ready to use.

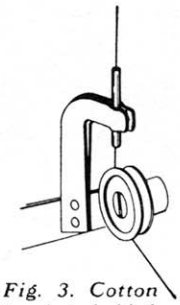


Fig. 3. Cotton sleeving held by clip.

Standard practice calls for a roll of tape being held at the right hand end of the machine and then cut by hand as required.

This can be improved upon by utilizing a cylindrical reel having vertical slats ½ in. wide, spaced ⅛ in. apart around the surface of this reel. A complete roll of tape can be wound on the surface of the reel, and then—by means of a razor blade passed downward between these vertical slats—the pieces of tape can be cut to any required length. Then they are always at hand, ready to be applied to the coil as required. (See Fig. 4.)

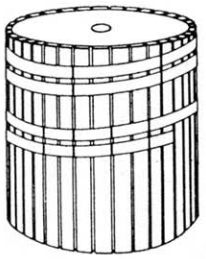


Fig. 4. Cylindrical reel with tape cut to various lengths.

NEW, LONGER-WEARING WIRE GUIDES AND HOLDERS

A new type of wire guide with a unique design which greatly lengthens the life of the guide and reduces replacement costs by as much as 75%, is now being supplied as standard equipment on Universal No. 84B Coil Winders, and is available for attachment to machines now in the field.

The shape of the new guide is rectangular, and at each corner there is a slot which serves as a channel for the wire. When one slot becomes worn, it is only necessary (instead of replacing the entire guide) to loosen the nut on the screw and turn the guide, bringing a new slot into position.

Thus, each guide is actually four guides in one, and each four-coil machine is equipped with four guides (available in two types), making the equivalent of a full set of 72 of the former type of guide. Two-coil machines will have two of either type.

Wire guide 84B-733 can be used with all wire sizes from 23 to 42 B&S inclusive and for winding coils from 1/16 to 1/8 in. traverse having a minimum coil spacing of 1/16 in. It is mounted on the machine by Wire Guide Holder 84B-378-10 when the direction of winding is from right to left or by 84B-378-11 (not illustrated) when winding is from left to right.

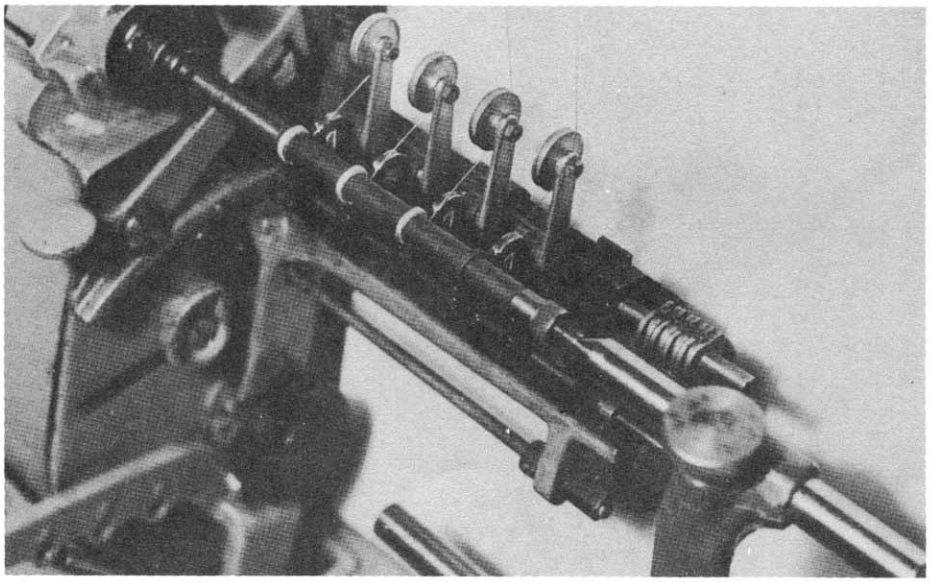


Fig. 1. 4-coil machine equipped with new type of wire guide. New slots are brought into position by loosening the screw, turning the guide, then tightening the nut. (Note: turning the nut makes tighter fastening than turning the screw.)

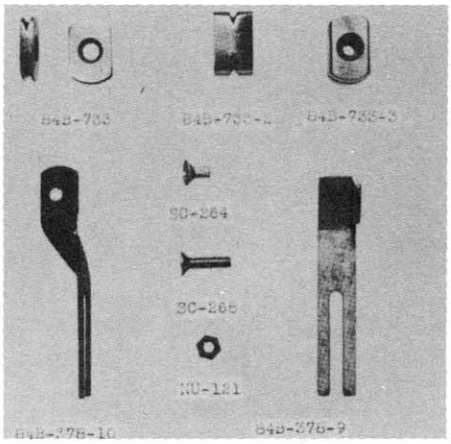


Fig. 2. AT TOP *Front and side views of 84B-733, left, and 84B-733-2, right. (84B-733-3 is same, except for wider slot).* BELOW *Wire Guide Holder 84B-378-10, left and 84B-378-9, right. Screw SC-264 is used with 84B-378-10, Screw SC-268 with 84B-378-9, and Nut NU-121 with both.*

Wire guide 84B-733-2 is used with the same sizes of wire (23 to 42 B&S), but for coils having traverses longer than 1/8 in. It is a wider guide and accordingly is mounted on a different holder, 84B-378-9.

A *special* guide, 84B-733-3, is available for heavier wire sizes, 19 to 23 B&S inclusive, and for coil widths 1/8 in. and over, but will be made to order only.

WINDING HORIZONTAL SWEEP COILS

FOUR COILS WOUND AT ONCE ON UNIVERSAL NO. 84 MACHINE

The tremendous interest in television all over the country has created a large and attractive market for producers of component parts for TV receiving sets.

For complete assurance of high quality and production in coils for television sets, manufacturers are using Universal Coil Winders.

One of the most difficult coils to wind is the so-called horizontal sweep or fly-back transformer coil (Fig. 1). This can best be wound on the No. 84 Universal Coil Winder (Fig. 2), which makes it possible to wind one to four coils at once for each of the three sections.

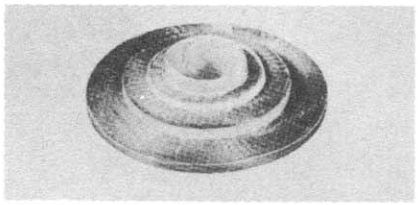


Fig. 1. Horizontal Sweep Coil.

The following technical data was prepared by our engineers and is intended as basic information when producing the horizontal sweep coil on the No. 84 machine.

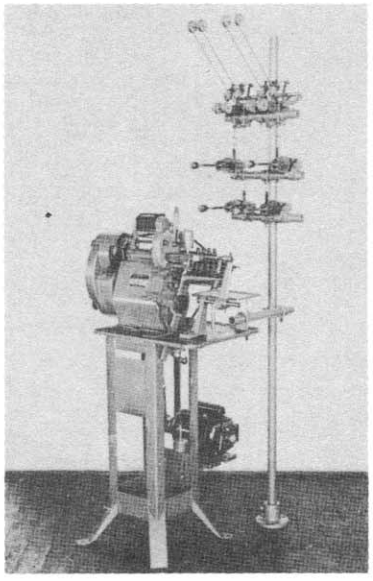


Fig. 2. No. 84 Coil Winder.

NO. 84 MACHINE SET-UP FOR TELEVISION HORIZONTAL SWEEP TRANSFORMERS

FIRST SECTION

Wire 375 turns of No. 28 single nylon and enamel covered wire (.0156 in. O.D.)

Cam 5/8 in. single throw.

Winding speed 750 rpm.

Wind 1½, using gearing 48 and 72 with any intermediate gear to mesh.

Wire guides wide-faced type.

Tension medium spring in fourth hole from top.

Pressure two weights on traverse frame cord.

Wind four coils at a time.

SECOND SECTION

Wire 1,000 turns No. 33 single nylon and enamel covered wire (.0099 in. O.D.)

Cam ½ in. single throw.

Winding Speed 750 rpm.

Wind 2/3, using gearing 119-80 with any intermediate gear to mesh.

Guides wide-faced type.

Tension sixth hole from top.

Pressure two weights on traverse frame cord.

Wind four coils at a time.

THIRD SECTION

Wire 1,000 turns No. 38 single silk and enamel covered wire (.0065 in. O.D.)

Cam 3/32 in. single throw.

Winding speed 400 rpm.

Wind 1/7th using gears 120-40-88-38. (With this compound gearing, use any small gear on the spindle shaft on the inside of the 120-tooth gear. The second and third gears will go on the intermediate stud with the 40-tooth gear on the outside and the 88-tooth gear on the inside. The 38-tooth gear will be on the clutch shaft, and should mesh with the 88-tooth gear.)

Wire guides narrow-faced type.

Tensions light spring in about the third hole from the top.

Pressure eight pressure weights on the traverse frame cord.

Wind four coils at a time.

HIGH PRODUCTION OF ACCURATELY-WOUND FOCUS COILS FOR TELEVISION RECEIVERS

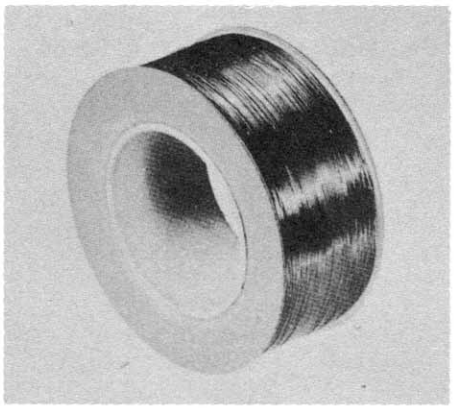


Fig. 1—TV Focus Coil.

Like other coils wound for use in TV receiving sets, the spool-wound focus coil is produced to close specifications which vary depending upon the type of set.

A large volume of focus coils now in use are wound on spools approximately 3 in. in diameter and 1-3/16 in. long, containing either 4500 turns of No. 29 enameled wire or 5500 turns of No. 30 enameled wire.

When these coils are wound "in multiple" — that is, ten to fifteen spools mounted on a common arbor and wound simultaneously — it is generally recognized that difficulty may be encountered maintaining the various wire guides in centralized location in respect to the coils. This is because any variation in length of spool will disturb the alignment, the condition being progressively increased by the number of coils wound on the same arbor.

For this reason, it is desirable that these spool-wound coils be produced one at a time in order to obtain accurate winding.

The Universal No. 102 Coil Winder is built with three individually-operated heads and is, therefore, an excellent coil winder for this type of work. Each head winds independently, and each guide has a micrometer adjustment which permits extremely accurate centering and thus corrects any lack of uniformity in lengths of coil spool.

Output is synchronized on the basis of handling time per coil. The operator supervises several heads simultaneously, and the winding is so scheduled that certain heads can be producing while manual operations are being performed on other heads.

This procedure assures higher output per operator at moderate winding speeds and results in more compact coils at these speeds.

Each winding head is automatically controlled by an electrically- operated counter, which — at the end of a predetermined number of turns — acts to disengage the clutch. No attention is required from the operator.

Wire retainers and other features reduce handling time, thereby increasing overall efficiency.

By assigning two machines of three heads each to an operator, daily production rate of 550 to 650 accurately-wound focus coils per eight hour day, is reported by various manufacturers.

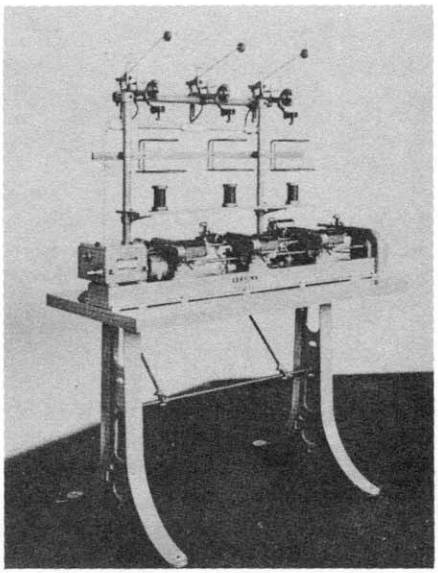


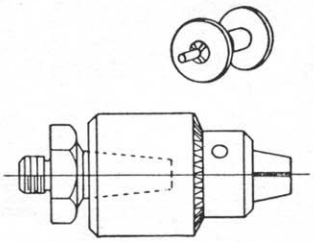
Fig. 2—No. 102 Coil Winder.

ARBORS FOR SPOOL-WOUND COILS

The selection of the proper type of arbor is important in order to insure quick handling of spools, keep manual operations at a minimum, and increase the over-all efficiency of the No. 102 Coil Winder.

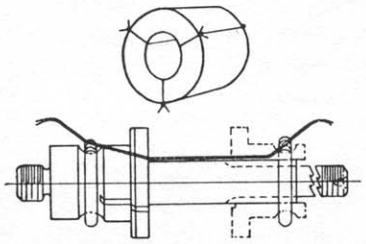
As a rule, the coil arbors are designed to fit in the 3/8 in. hole which is a part of the face plates supplied with each winding head. Any such arbor must be of a type that not only will hold the tube or core securely, but will also position the coil correctly in respect to both centering and concentric rotation.

The majority of the No. 102 machine users design and manufacture their own coil arbors. Here are a few designs that proved effective for the types of coil forms shown.



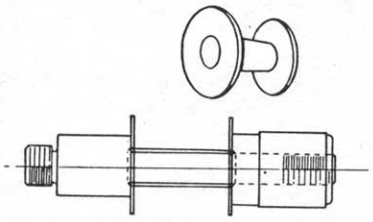
For coil forms with extended central core — automotive regulator coils, etc.

The standard face plate employs a tapered insert on which is mounted a No. 2A Jacobs Drill Chuck. For long coils, such as telephone ringer coils, or for coils where the central core is too short for the chuck to give the necessary security, an outer support (tail-stock) is recommended and can be provided.



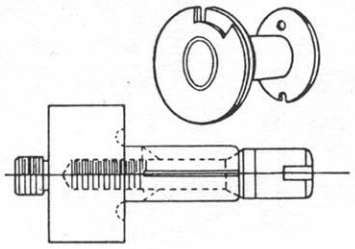
For headless coils

This coil form is for use on windings with or without a central core, but where no heads are provided. The finished coils are usually tied before removal; therefore, the flanges of the coil form are slotted for the insertion of tieing cords before the winding is started, and the ends of these cords are held in place by the coiled springs indicated.

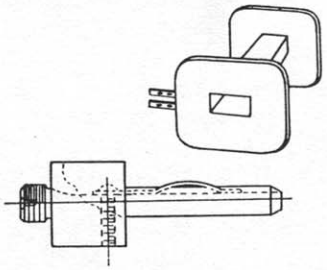


For cylindrical spool-type coil forms

This type of arbor is used for holding spool-type coil forms having definite heads or flanges.

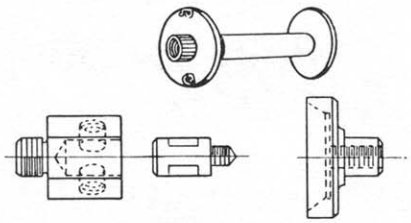


Cylindrical spool-type coil forms can also be held in place by means of an expanding arbor.



For coil forms with square or rectangular aperture

This simple type of arbor holds the coil form in place by means of a flat spring which presses against the inner surface of the form.



For coil forms having a solid center with threaded hole in one end

The stud acts as an "adapter," and an insert is used which has a 3/8 in.-24 shoulder. The stud can be designed to fit a variety of threaded holes, and as recommended above, an outer support or tail-stock is suggested. These tail-stocks have been designed for quick handling and hold the right hand end of the coil firmly in place by means of a ball bearing center for which an adapter is also required for various types of coil form heads.

NEW WIRE BREAKAGE DETECTOR

A new wire breakage detector has been developed for use with the "over-end" type of tension on the No. 102 Universal Coil Winder.

This device reduces the number of rejected coils to a minimum. It controls the winding so that when a wire spool runs out or breaks, the winding arbor will stop promptly. There is no chance of the arbor continuing to rotate after the break with consequent counting of wire turns that are not being wound.

The Wire Breakage Detector also increases rate of output, as it decreases operator handling time and assists a faster start of the winding arbors.

EASY INSTALLATION

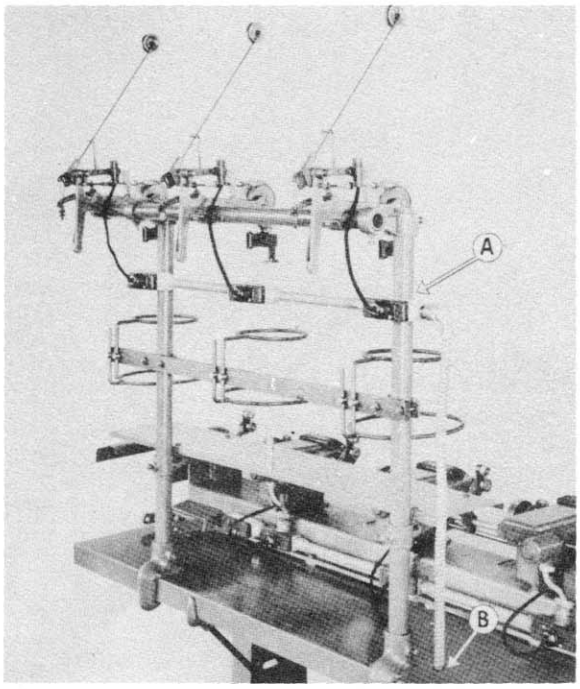
When supplied for mounting on machines already installed, the attachment is assembled at the factory as completely as possible. The outlets are made up in a unit, completely wired, and supplied with Greenfield cable to protect the wires.

The unit is attached by means of a screw in the back of each end outlet. It is only necessary to drill and tap a No. 10-32 hole (A) in the back side of each upright 6 in. from the top.

A 7/8 in. hole (B) is cut in the table. Under the table a box is to be mounted and connected to the

box containing the main wiring circuits. Because of added wires from this point to the solenoids, it is necessary to increase the size of the fittings between the box and the machine.

After the connections have been made, it is only necessary to place the mercury switch lever on the projecting left-hand end of the compensator stud and fasten it with a small collar. The projecting lug on the under side of this lever rests against a second stud and keeps the lever horizontal. Each splash-type mercury switch is fastened to the end of the lever by a small clamp, and a breakage lever that has a short angular bend is mounted in the lug on the side of the lever with the angular bend over the compensator. The plug attached to the switch is inserted in the outlet.



When the wire spool runs out or wire breaks, the compensator is released and flies upward, striking the breakage lever. This action agitates the mercury switch, and the mercury splashes against the contacts, thereby operating the controlling solenoid. The turn counter stops at the same time the winding arbor stops, and registers the exact number of turns in the partly wound coil. When the wire is spliced, the coil can be completed without resetting the counter.

IMPROVED TENSIONING FOR COIL WINDING

Redesign of several parts and rearrangement of other parts on the standard strap-type unrolling tension attachment for all Universal coil winders have resulted in better winding and longer life of the tension.

Stronger Supply Spindle

The deep groove and the milled slot in the former type of supply spindle have been eliminated in the new design, resulting in a much stronger spindle, less liable to break or bend.

Longer Supply Spindle Life

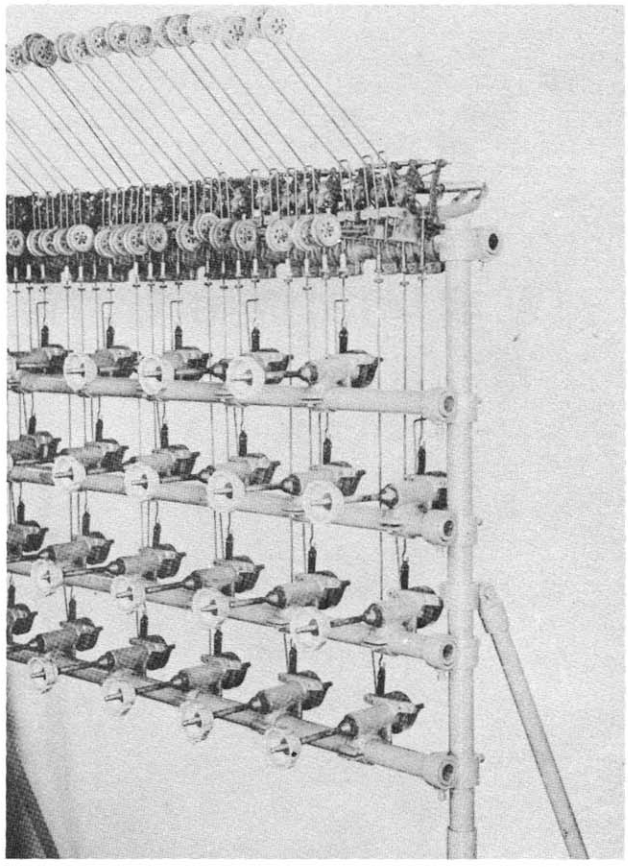
The spindle has been reversed on its support, permitting the brake wheel to be placed on the rear end of the spindle and the wire spool accordingly brought closer to the bearings. This means better support for the supply spindle, eliminating the possibility of whip or vibration and thus lengthening the life of the part.

Easier Spindle Adjustment

The front end of the supply spindle is now threaded for about 1½ in. and is fitted with a quick-acting screw-on locking nut. This long thread accommodates a wide variety of spool lengths, doing away with the time-consuming necessity of readjusting the spindle for each change in spool length. The floating rear cone, with the spool driving pin, the spring, and the collar formerly used, have been replaced with a fixed cone that also acts as a front thrust collar to position the spindle in the bearing; the brake wheel serves the same purpose behind the bearing.

EASY INSTALLATION

Applying this new tension attachment to existing machines has been made very simple. In attaching the compensators, a new compensator bracket support holder is used, and the support bars are attached behind the wire supply support. In this position, the brake connecting rods are aligned with the brakes, and all the parts, with the exception of the auxiliary wire guide wheel, are put in place and adjusted exactly as on the old supply attachment. In order to bring the auxiliary wire guide wheels in line with the center of the wire spools, it is necessary to mount them on extensions located at the same point these wheels formerly occupied.



Section of wire creel showing rearrangement of parts.

This tension attachment is available for all Universal Nos. 84B, 96, 102, 104, 107 and 108 Coil Winding Machines.

NEW HIGH-SPEED COIL WINDER

Double Winding Speed
Increases Operator Output
On Spool-Wound Coils
Having High Number of Turns

To accommodate the market's need for higher production on high-turn coils, Universal has redesigned the No. 102 Multi-Head Coil Winder to *double* its winding speed.

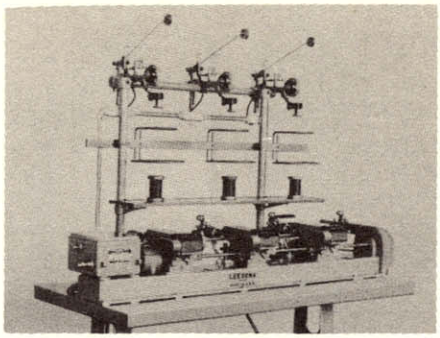
With a new maximum speed of 5000 rpm, the High-Speed 102 is now particularly adaptable to the winding of timing motor coils, telephone relays and other high-turn coils.

Full efficiency on this type of machine is realized when winding time and manual coil-handling time are so synchronized that there is no waste time.

On a three-head machine, it is desirable that handling time be no greater than one-half the winding time. Thus, if handling time per coil is thirty seconds and spindle speed is 2500 rpm, coil size is limited to 2500 turns. unless there is to be some waste time.

With the new high speed of 5000 rpm, the operator of the High-Speed 102 can handle three coils up to 5000 turns requiring 30 seconds handling time — without any unproductive waiting time.

The machine can also be run at lower rates of speed for coils with fewer wire turns — thus providing the maximum in flexibility. Also, at high speed it is possible to wind only one coil per spindle. In order to wind two coils per spindle, it is necessary to cut down the maximum speed to 2500 rpm because of the double amount of handling time required.



No. 102 High-Speed Coil Winder.

PROTECTION AGAINST OIL LEAKAGE

In redesigning the No. 102 for higher speed, oil seals were added at the driving shaft bearings and an extra lip added to the spindle case cover and gear cover to protect against oil leakage. Even at the new high speed, the machine is oil-tight.

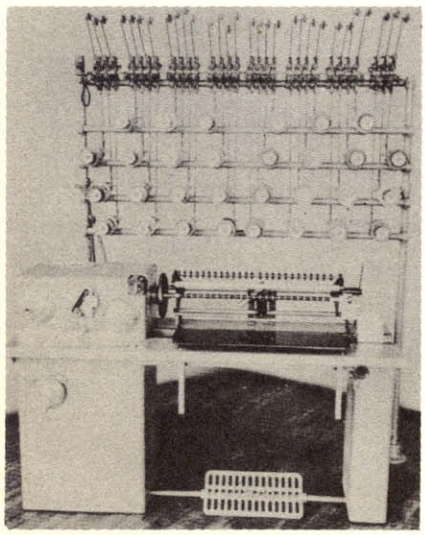
FEWER GEARS NEEDED

The shafts, sleeves, etc., in the auxiliary gainer case have been redesigned to permit the use of a single type of gear instead of the two types formerly required. This change permits the entire range of the machine to be covered by a set of 53 gears instead of the 100 gears formerly needed to effect the same coverage. The first cost of the gears is materially reduced and inventory is smaller.

The same table is used and the general over-all appearance of the machine has not been changed. However, a ½ hp motor replaces the former ¼ hp motor.

No other changes have been made, except that like the more recent models of No. 102 Winder, the High-Speed 102 is equipped with the latest Over-End Tension and the new Wire Breakage Detector. The over-end supply is particularly adaptable to high speed winding, because the wire is taken off over the end of the spool without having to overcome spool inertia and perfect control of the wire is maintained by the compensator. The Wire Breakage Detector controls the winding so that when a wire spool runs out or breaks, the winding arbor will stop promptly. This prevents the counting of extra wire turns that are not being wound.

NEW MANUALLY-OPERATED "STICK" WINDER GETS "ELECTRICAL MANUFACTURING" DESIGN AWARD - UNIVERSAL NO. 108



No. 108 Coil Winder.

A fully automatic coil winding machine pays its way only when the runs are long enough to justify the expense of the set-up time required.

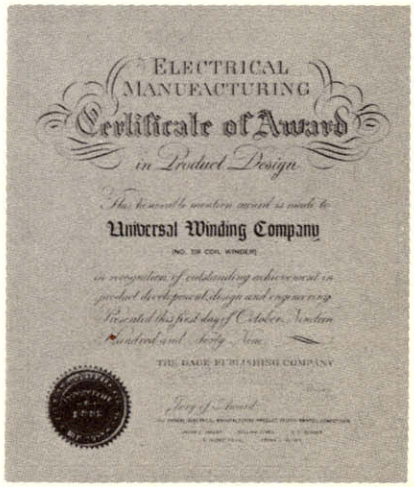
Since many coil lot sizes are small, only a portion of the market requirements can be filled economically by the use of automatic machinery.

This situation, together with the obsolete condition of many of the manually-operated winders in the electrical and electronic parts industries created the necessity for developing a manually-operated winder of *modern* design to supplement the automatic type.

No. 108 COIL WINDER

The No. 108 Coil Winder was developed by the Universal Winding Company to meet the demand for a modern manually-operated machine to wind paper-insulated coils in multiple or "stick" form.

Its design received an Honorable Mention Award in the 11th Annual Product Design competition sponsored by "Electrical Manufacturing."



The objective of Universal engineers was to produce an integrated unit, clean and functional, with labor-saving features which would warrant replacement of

present equipment, and with a selling price low enough to be attractive to the predominantly "job shop" type of market characteristic of the ever-changing electrical and electronic parts industries.

After extensive field surveys and an analysis both of suggestions made by electrical engineers, superintendents and operators, and of their criticisms of existing machinery, our engineers determined upon the basic principles for the 108 Coil Winder that are incorporated in the following outstanding features.

Quick Set-Up All machine functions are built around the idea that quick set-up and finger-tip control are the best means of creating savings in the use of skilled labor during machine set-up.

Flexibility The machine can be adjusted quickly to accommodate changing requirements of wire size, coil length and diameter.

Accessibility Operations involved in preparing and finishing coils vary from job to job, but access to the coil stick is completely unhampered and all coils are readily processed. Accessibility features are also provided for ease of maintenance and adjustment.

Simplicity Since operators of this type of machine are usually women and may be disturbed by any complexity of controls and adjustments, the simple external appearance of this machine promotes confidence.

Cost Compared with an automatic machine winding the same type of coils, the cost of this machine is very modest, considering its efficiency and the high quality of its construction.

DESIGN FEATURES

Following are some of the elements of machine design which were responsible for the selection of the No. 108 Coil Winder by the judges of the "Electrical Manufacturing" competition.

Leadscrew Traverse Compared with the cam method of traversing the wire, the leadscrew type of traverse is more versatile, not only providing a more positive control of wire lay, but also permitting lead attachment procedures without disturbing the traverse setting.

Quick Change - Gear System The leadscrew gearing is independent of the length of traverse and is designed as a turns-per-inch system.

Selection of gearing depends upon only two things; the wire size and the closeness of wind. This system is planned to provide any specified spacing, within the range of the machine, between turns. This permits a compact, two-stage, quick-change gear system in which a set-up for any turn ratio is made simply by moving two levers to correspond to the wire size specified. This eliminates the necessity of figuring or changing gears.

Reversing Clutch A single leadscrew, reversing its direction of rotation at the traverse extremities, provides accuracy and cuts down wear. The follower is always in mesh with the leadscrew.

The leadscrew is operated by a double - throw jaw - reversing clutch which is spring-loaded. Control of release through hardened sears insures an accuracy of one tooth. As the leadscrew has an Acme thread with ten turns per inch, the resultant accuracy at the coil is within .003 inches.

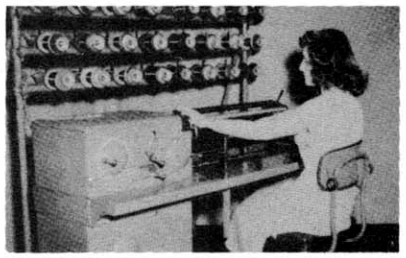
Drive Power is supplied by a ½ hp AC constant speed motor driving through an adjustable-sheave speed controller to a multiple-disc friction clutch attached directly to the spindle. Speed range is 400 to 2200 rpm, and speed selection is made by turning a crank on the front of the column.

The clutch, connected to the foot treadle, provides smooth control of starting speed. A brake holds the spindle when not running.

Ratio Bar Adjuster An adjustable ratio bar, incorporated between the leadscrew follower and the traverse rod, permits stepless adjustment between any two settings of the change gears. The bar interposes an additional velocity increment between the follower and traverse assembly that results in opening or closing the wind. A crank on the front of the machine head adjusts this bar.

Rapid Traverse A power take-off from the motor re-indexes the wire guides to either end of the traverse when the wires are transferred to a new stick. This is controlled by a small toggle switch located on the table in front of the gear case. To drive the traverse rapidly to the left-hand, without adding turns of wire, the switch is pressed toward the left, and vice versa to the right end.

Counter The counter is mounted in plain sight and can be pre-set to stop the machine when the correct number of wire turns have been wound.



Note convenience of controls.

Controls All controls are conveniently located for ease in operation.

The hand-wheel is large in diameter and offers a smooth surface for the operator's hand with plenty of knuckle clearance.

One motion of the tail stock handle unlocks the live center, retracts it, and relocks it.

The lever for the marking blades is easily accessible, and the blades are guarded.

The paper feed tray is located at arbor height for rapid and accurate insertion of paper, but can be quickly and easily depressed to provide ample clearance when replacing stick.

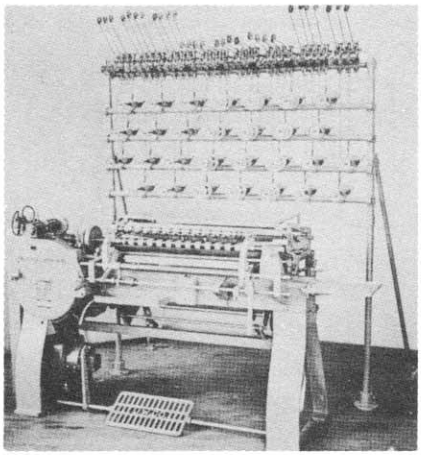
The treadle, through which the operator controls starting speed and braking, is large enough so that it can be operated by either foot.

The height of the machine has been designed to locate the coil stick so there will be a minimum of fatigue.

Electrical Controls are used wherever possible. Micro-switches control the solenoids. One switch, on the creel, closes the circuit when a wire breaks or runs out; another, on the counter, closes when the predetermined number of turns are wound. A two-pole, double-throw switch, actuated by the reversing clutch, opens the circuit when the end of the traverse is reached. A red indicator light shows when the electrical system is ON. Traverse direction indicator lights are in full view of the operator.

Bed The bed is a single casting, extending the full length of the machine, and is of aluminum to cut down weight. The supporting columns are made of single steel sheets, formed and welded and are braced at the bottom by steel straps which serve as feet. The left-hand one houses the motor and drive mechanism and the right-hand one is a cupboard for the operator's personal belongings.

NEW INTERLEAVE COIL WINDER IS FULLY AUTOMATIC



No. 107 Universal Coil Winder.

Universal's new high speed automatic No. 107 winder produces accurately-wound paper-insulated or acetate-insulated coils at a very high rate of output.

Automatic feeding Single or laminated insulating sheets are fed into the machine automatically. Rate of feed, with either paper or acetate, can be as high as 25 inserts per minute.

Thus, on a coil containing 100 wire turns per layer, the machine can be operated at winding speeds up to and including 2500 rpm.

An entirely new type of delivery shelf has been designed to provide high accuracy. It imparts a uniform backward pull on the paper as it is fed into the coil, resulting in windings of highest possible density.

This delivery shelf will handle insulating papers, either "Kraft" or "Glassine," from .0006 in. to .003 in. in thickness, and where the machine is equipped with devices for removing static, acetate sheet is handled at high winding rates.

The machine utilizes a single width of insulating paper, and this can be 24 in. or up to 25 in. maximum if required.

Accurate wire control Wire sizes accommodated range between No. 19 and No. 42 (B&S). The creel stand is independently mounted, and holds up to 30 wire spools at a time.

The wire spool spindle is of the latest design, with solid construction. The braking device is mounted on the rear of the machine to give better balance between the wire spools and the ball bearings.

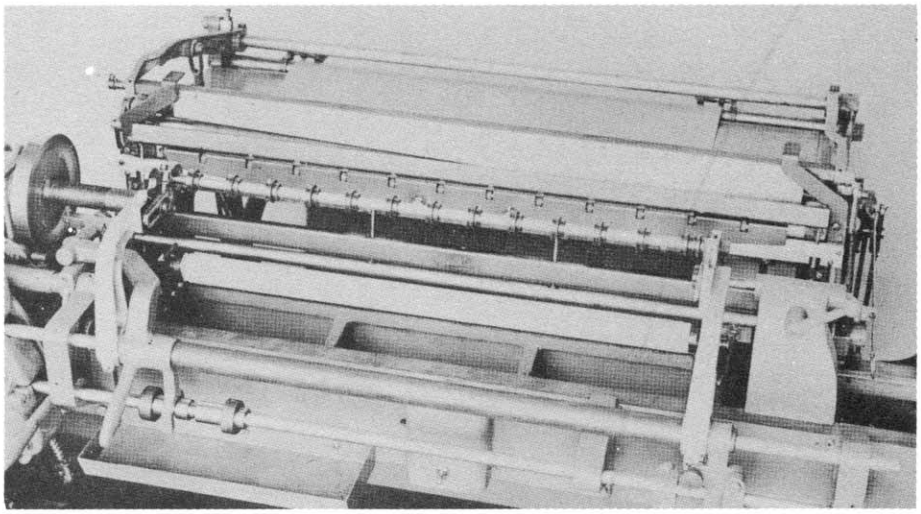
Efficient winding A quick return of the wire guides is assured at the end of each wire layer, and thus there is no possiblity of crossed turns due to delayed return, particularly where wear develops.

The same efficient traverse mechanism used in the Universal No. 105 Coil Winder has been adopted for the No. 107. No changes in cam are necessary for various lengths of wire layer.

Special attachments These include an auxiliary "space-wind" traverse for spacing the first and last layers of high-tension coils. A special "mid-tap" attachment permits shifting the wire guides at the end of a wire layer for "tap" location or to arrange for starting and finishing leads.

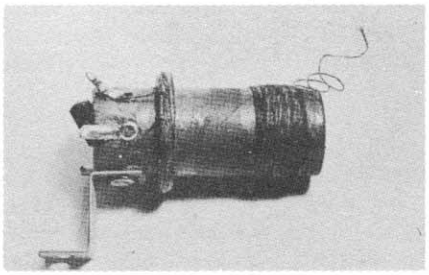
Where required, a "dual-counter" is available so that the machine will stop automatically for the removal of a mid-tap.

The new No. 107 Coil Winder has already demonstrated, in preliminary installations in plants of several prominent electrical manufacturing plants, its ability to turn out coils of the highest quality.



Closeup showing coil arbor in transfer position.

How to Wind "Litz"



Coil of Litz Wire wound on Universal No. 84 Coil Winder.

Litzendraht Wire, or "Litz" as it is commonly termed, is made up of strands of wire that are insulated from each other throughout the length of the wire but are connected at the ends. This wire is frequently used in the winding of low and medium radio frequency coils to minimize the phenomenon known as "skin effect." It is also used, because of its extreme flexibility, as coil leads.

A characteristic of radio frequencies is their tendency to travel on or near the surface of the conductor. Since wire of the small diameters that are used as the individual strands of Litz Wire has such a small cross-section, the resistance is naturally rather high. For this reason, difficulty would be experienced in producing an efficient coil of high frequency from such wire alone. Litz Wire, however, because of its paralleled insulated strands, effectively increases the current-carrying cross-section of the wire, producing a conductor which has low resistance at radio frequencies.

However, due to irregularities of stranding and capacitance between the strands, ideal conditions are not realized, and Litz Wire is seldom used above 1000 to 2000 Kcs.

Litz Wire is made up in a number of sizes of enameled wire and

in a variety of numbers of strands. It is given an outer insulating covering of a single or double layer of either silk or cotton yarn. Because of this construction, it is almost impossible to determine the exact outside diameter of the wire by calipering; therefore, the choice of the correct wire guide to use in winding is difficult to make.

The following formula may be of assistance in determining wire sizes and in selecting wire guides for winding this type of wire on the Universal No. 84 Coil Winder.

When D = outside diameter of wire

and d = outside diameter of individual strands

and N = total number of strands

$D = 1.155 \text{ in.} \times d\sqrt{N}$

For covering insulation add the following:

Single silk	.002 in.
Double silk	.004 in.
Single cotton	.004 in.
Double cotton	.008 in.

New Paper Delivery Shelf Increases Range

Redesign of the paper delivery shelf for the Universal No. 104 Coil Winder permits the use of not only Kraft and Glassine paper ranging from .0006 in. to .002 in. but also acetate film of the same thicknesses.

A shelf extension is used for papers less than .001 in. thick.

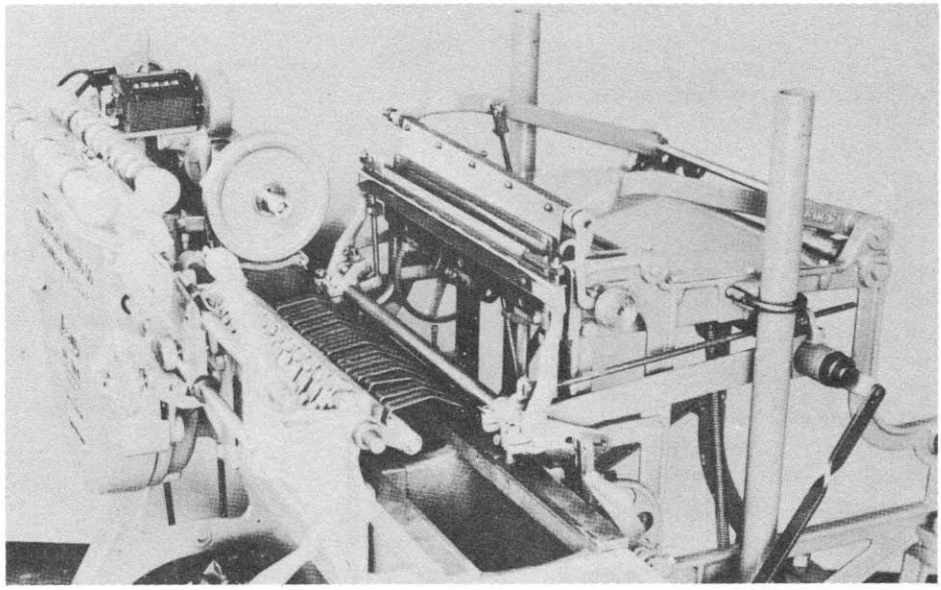
A heavy paper attachment, in which a roller-type measuring bar and a roller-type lower knife guard are used, handles papers from .0025 in. to .005 in.

When using the new delivery shelf which is standard on all machines shipped after May 1, 1950, the shortest length of paper insert is 1½ in. Of this length, ½ in. is projecting paper, leaving 1 in. between the edge of the lower knife and the edge of the delivery shelf.

Therefore, the Short Paper Attachment formerly used for inserts as small as 1¾ in. will no longer be needed. It will still be available, however, for old machines.

The longest insert, with the standard shelf, is 15 in. if the paper projects ½ in., or 16⅞ in. if the paper projects 2⅜ in.

The older model of the heavy paper attachment can be used on this 1950 model machine if available, but the upper portion of the delivery shelf and the delivery tension plate would be discarded. However, the new heavy delivery shelf is lower priced and is much more desirable.



Closeup of new No. 104 delivery shelf.

New high-speed cams, which permit the machine to be speeded up so that it will operate at 25 cycles instead of the customary 17 cycles, can be used on this new No. 104 machine. At this speed, however, the maximum length of paper insert will be 6 in.

NEW SUPPLY SUPPORT IS MORE RIGID, VIBRATION-FREE

Nos. 84B and 96 Coil Winders

An extremely rigid mounting for supply and tension attachments on the Nos. 84B and 96 coil winders (for "lattice-type" and "layer-wound" coils, respectively) has resulted from recent redesign of the supply support (Fig. 1).

Furthermore, since the new support is completely detached from the winding machine, vibration emanating from the winder cannot be transmitted to the supply.

The vertical support pipe is now made in two sections — one section is 38 in. long and the other is 32 in. long. At the time of installation, the two sections are coupled together, and the complete assembly attached to the floor with the longer of the two sections on the bottom. A clamp is added to the upper section just above the coupling and two braces are bolted to this clamp. The braces are then secured to the floor thus preventing the support pipe from swaying in any direction.

A supply support bar is attached to the vertical pipe between 47 and 48 in. from the floor, and a compensator bar is mounted approximately 14 in. above this point. When single coils or two coils are being produced, one supply support bar is used; when four coils are being produced, a second bar is attached midway between the compensator bar and the first support bar. The position of both supply support bars may have to be changed slightly so that the brake connecting rods can be attached to them.

The new all-steel welded pedestal which is now standard for the 84B, 96 and 103 Coil Winding Machines is also shown in Fig. 1. The pedestal is extremely sturdy, yet much lighter in weight than the cast iron type.

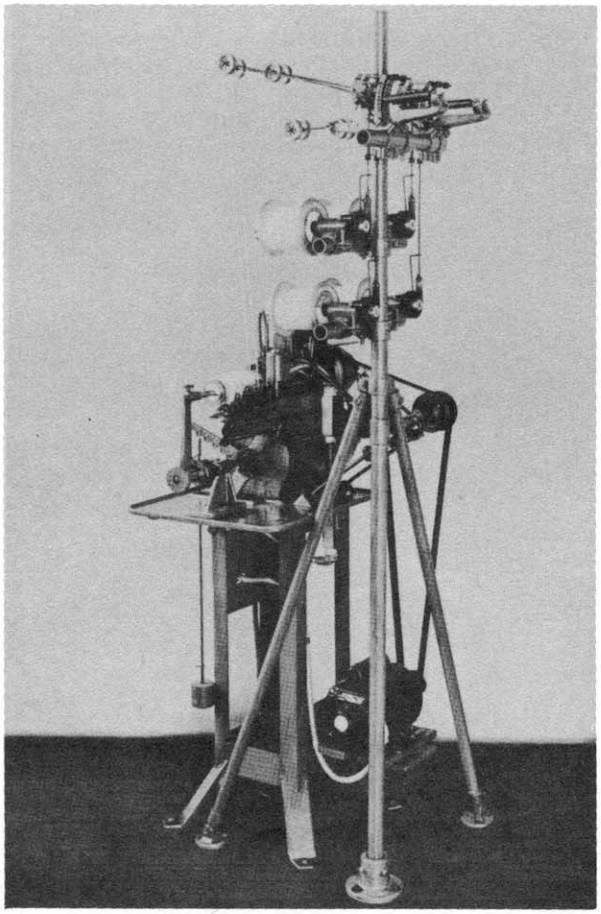


Fig. 1. No. 84B Coil Winder, showing new supply support and pedestal.

CUTTING COIL STICKS

Several methods are used for cutting coil sticks. However, we believe that the most efficient method is to use a band saw equipped with a blade having an undulated cutting edge. Such a saw cuts the coil stick cleanly without leaving ragged edges or disturbing the wire layers.

The saw blade should have a double bevel. Using a blade with only one side beveled results in "travel"—that is, the blade will work to one side as it cuts through the coil.

We recommend a blade with the following specifications: No. 21 gauge steel, 1/2 in. wide, 1/16 in. double bevel with 3/4 in. to 1 1/4 in. spacing between "rounds" or high points. Points should be rounded rather than peaked, because sharp peaks tend to tear rather than cut cleanly.

ADJUSTMENT OF NEW STRAP-TYPE TENSIONS

The recently redesigned strap-type unrolling tension which gives smoother running and faster spool loading on various types of coil winders, is quickly adjusted to provide correct tension for all wire sizes from No. 19 to No. 42 (B& S).

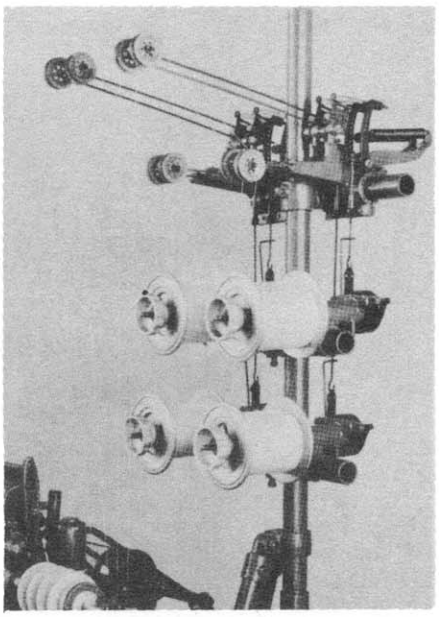
These adjustments are obtained through the use of two different compensators, three sizes of tension springs, and two plate springs, as shown below. All these units are made to careful specifications to insure uniformity:

For wire sizes 43-46, a special light compensator, spring and brake band combination is available primarily for single coil winding.

How to Set Tension

When setting up a group of these strap-type unrolling tensions, the proper adjustment for one tension is first determined. The remaining tensions can then be adjusted to agree with this first unit. In other words, when the initial setting has been accurately duplicated on the remaining tensions,

Wire Range	*Compensator*	*Tension Spring*	*Plate Spring*
19-28	Heavy	Heavy	Heavy
29-35	Light	Medium	Light
36-42	Light	Light	Light



Redesigned strap-type tension used for a variety of coil winders.

each calibrated tension spring will exert the proper amount of tension on the wire involved.

For this reason it is important that the first unit be adjusted very carefully, for any error in this setting will have a direct bearing on the operation of all tensions and, consequently, on the quality of the coils produced as well as on the efficiency of the winder.

Excessive tension causes the wire to stretch, resulting not only in an incorrect resistance, but also in damage to the enamel covering. Furthermore, on paper-insulated coils, it also may cause the wires to cut through the insulating element and, consequently, destroy the entire coil production.

On the other hand, *insufficient* tension will result in coils that are wound too loosely for acceptance.

Many users have found that a tensiometer is desirable for this initial setting. We have been advised that the following meter readings, taken on one prominent type of tensiometer at an average winding speed, will give satisfactory results:

27	B&S	Gauge	1079 Grams
28	"	"	855 "
29	"	"	678 "
30	"	"	537 "
31	"	"	426 "
32	"	"	338 "
33	"	"	268 "
34	"	"	213 "
35	"	"	169 "
36	"	"	134 "
37	"	"	106 "
38	"	"	84 "
39	B&S	Gauge	67 Grams
40	"	"	53 "
41	"	"	42 "
42	"	"	33 "
43	"	"	26 "
44	"	"	21 "
45	"	"	17 "
46	"	"	13 "

These figures apply to round coils. When rectangular coils are being wound, less tension should be applied.

The use of a tensiometer on each setting is not imperative. If a careful record is kept of (1) the tension setting on a definite wire size at a given winding speed and (2) the type of tension springs and compensator used, the setting can be duplicated exactly whenever required.

NEW SELF-CENTERING TAIL STOCK INCREASES COIL OUTPUT No. 84 Coil Winder

More rapid handling of coil tubes and finished coils results from the use of the new tail stock (outer arbor support) with which No. 84 Coil Winders are now being equipped.

Perfect concentricity of coils is also assured.

Unlike previous designs, the new tail stock is self-centering. When starting a new set of coils, this arbor support correctly centers itself and engages the end of the arbor without special attention on the part of the operator, who merely has to swing it into position. The center, which is mounted in the top of the arbor support arm, is adjustable for various arbor lengths.

The arbor support arm is mounted on a shaft supported by a bracket which is attached to the winder shelf. Four screws in the base of the bracket are used to make initial adjustments for aligning the center with the arbor.

A tongued collar on the shaft engages with the grooved end of the arbor support arm (as shown in Figure 1) and always positions the center in exact alignment with the arbor. The tongue-and-groove arrangement is held to close manufacturing tolerances in order to prevent any movement of the supporting arm while it is in the winding position.

A spring and collar located inside the base of the arbor support arm permit the center to be withdrawn from the arbor end when a completed set of coils is being removed. The spring and collar lock the tail stock assembly and hold the center against the end of the coil arbor when the next set of coils is started.

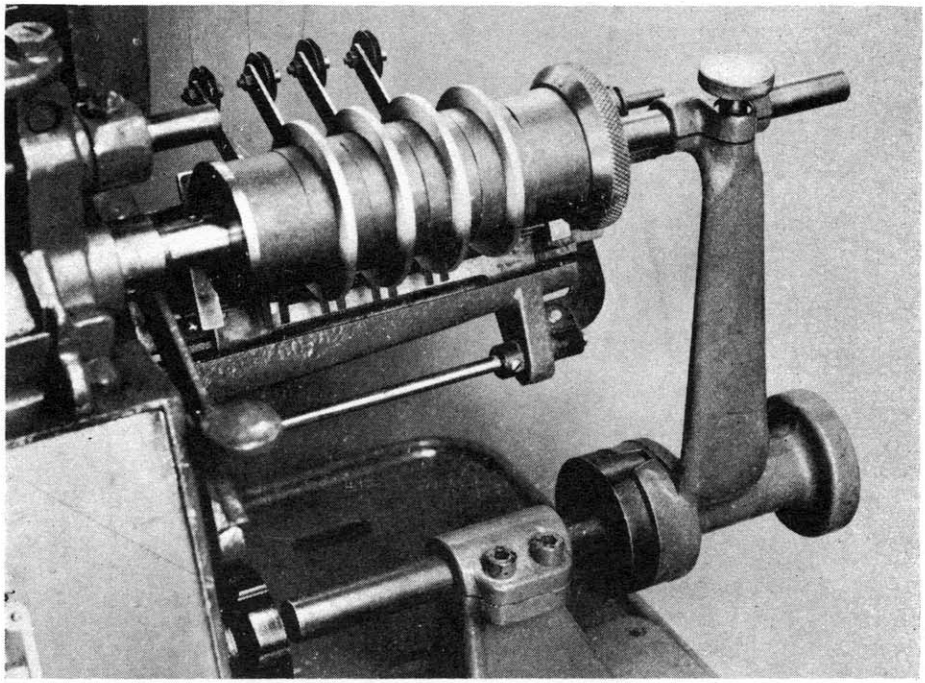


Fig. 1. No. 84 Coil Winder equipped with new tail stock.

In order to remove a completed group of coils, the operator merely has to shift the arbor support arm to the right and let it swing forward and away from the traverse frame back. To re-engage the center with the arbor when starting a new set of coils, the arbor support arm is flipped back to a vertical position.

Although developed primarily for use with the No. 84 Coil Winder, this arbor support can also be used with Universal's No. 96 Winder which produces cotton-interwoven coils. On the right-hand side of the machine, there is a brace which supports the cotton traverse guide lever rod. This brace must be altered slightly in order to use the new tail stock with the No. 96 Winder.

NEW DRIVE BELT - Nos. 84 and 96 Coil Winders

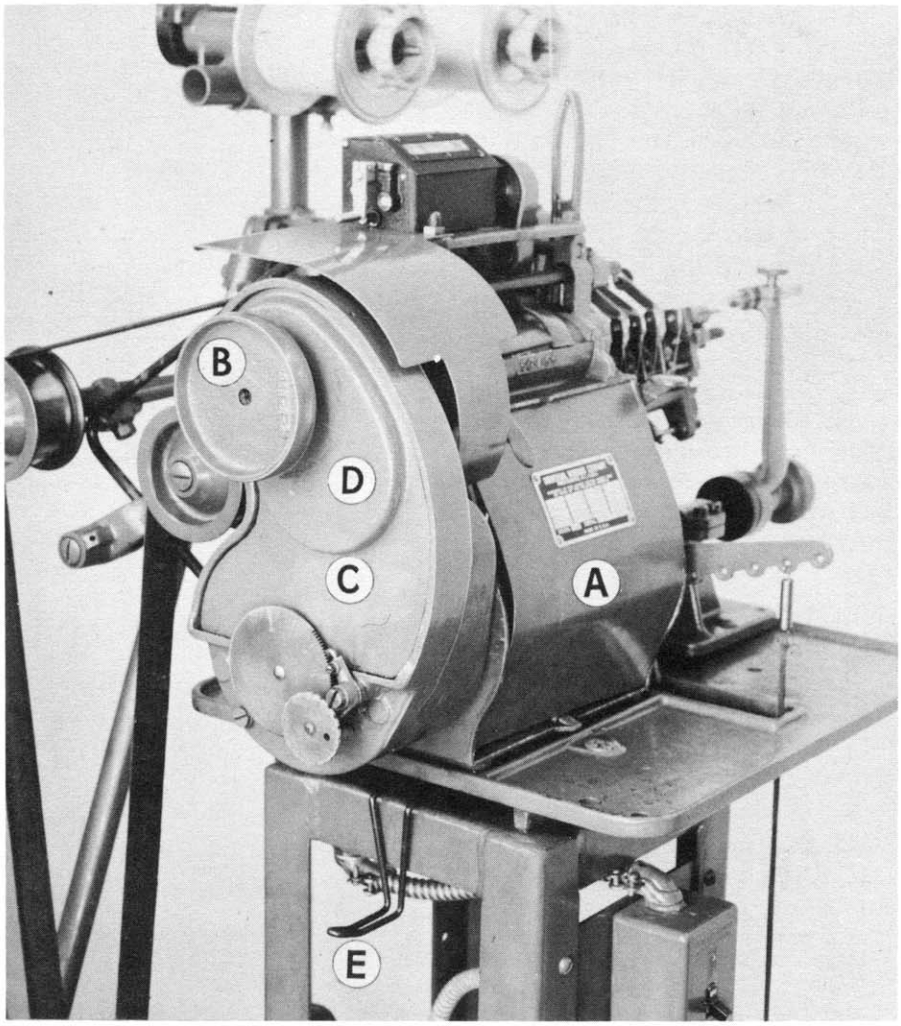
Smoother operation of the coil winding machine and assurance against loss of winding speed due to belt slippage result from use of a new flexible drive belt for these machines.

It replaces the endless leather belt formerly used, and is recommended for installation on machines now in use.

The new belt is made of rubber-impregnated fabric, woven endless. It is 1-5/16 in. wide and slightly over 1/16 in. thick. Because of its flexibility, it conforms more readily to the curvature of the pulleys than the type formerly used. It also recovers more easily from bending, with the result that much less vibration is created and transmitted to the pulleys and ultimately to the winder.

Since this belt is woven endless, it is necessary to remove the gainer case when applying it to the No. 84 machine. This is done as follows:

1. Remove the frame cover (A) by inserting a screwdriver between the upper edge of the cover and the machine frame and then prying downward.
2. Remove the hand wheel (B). (On older models there is nut at C which must also be removed.) The cover (D) and two gainer gears on the spindle can now be removed.
3. Unscrew the spindle stopping lever wheel from the right-hand end of the cam shaft and loosen the lock nut and screw in the cam.
4. The gainer case can now be withdrawn. It is advisable to hold the cam roll while withdrawing the gainer case; otherwise this roll may be lost.
5. Hang the gainer case on the hook (E) on the pedestal to prevent spilling the oil out of its reservoir.



After positioning the new belt on the driving pulley, the gainer case is replaced on the machine in reverse order to the sequence outlined above, making sure that the cam roll is also replaced.

The belt can be applied to the No. 96 machine without the removal of any parts.

On both machines, motor and idler pulleys should be aligned carefully so that the belt will not ride on or against the pulley flanges, as this will cause excessive belt wear.

Belt dressing should *not* be used with this flexible belt.

ELECTRONIC SPEED CONTROL
Universal No. 107 Coil Winder

A slow start and a constant winding rate after the arbor reaches the desired winding speed are vital to successful production of coils of fine magnet wire.

If the winding arbor should be started too abruptly, wire breakage will result. Therefore, the arbor should be started slowly and gradually accelerated until it reaches the predetermined winding speed. If the acceleration is not smooth and if the winding speed is not maintained at a constant rate, tension may vary during winding of the coil stick, affecting the quality of the work.

Slow, cushioned, automatic starting is assured on the Universal No. 107 (automatic paper feed) coil winder equipped with an electronic speed control.

This device permits the operator to use "push button" starting. With it, she does not have to "jockey" the arbor up to speed. The electronic speed control automatically and smoothly accelerates the winding arbor up to its required winding speed, and, because of its constant torque characteristic, maintains an unvarying speed thereafter. This results in a minimum of wire breakage and an even tension from start to finish of a coil stick and from stick to stick.

The heart of this electronic control system (Fig. 1) is an arrangement of tubes and circuits that

converts alternating to direct current and controls the amount of current carried to a d-c motor.

This control is mounted, as shown in Fig. 2, in the rear at the left hand end of the machine.

A small potentiometer, used in conjunction with the electronic control, is mounted on the front of the machine at the right-hand end. This enables the operator to *preset* the winding speed at any desired figure up to 3000 rpm and then to start the winder by merely pressing a push button located above the switch. The electronic control then automatically starts the arbor — slowly at first to prevent wire breakage and then gradually accelerates it until it attains the preset winding speed.

Once the potentiometer is set at a predetermined speed for the first coil stick in a setup, it does not have to be changed. The electronic speed control starts and accelerates the winding arbor at a uniform rate of speed on each succeeding coil stick.

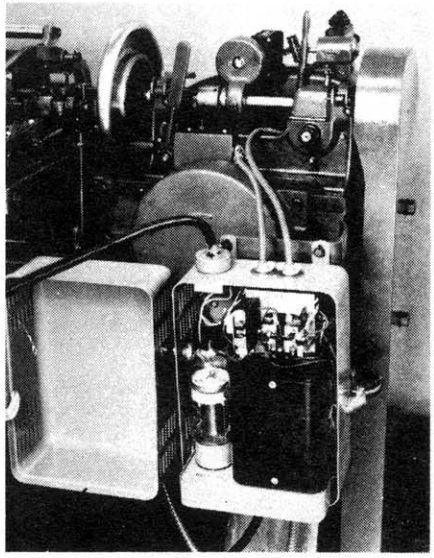


Fig. 1. Electronic speed control which automatically starts the winding arbor.

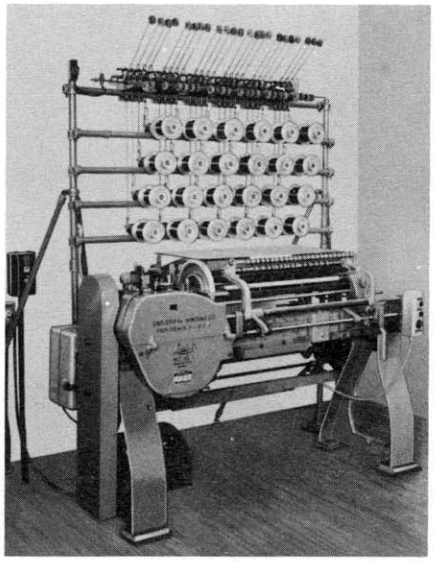


Fig. 2. Universal No. 107 (Automatic Paper Feed) Winder equipped with electronic speed control.

Circuit characteristics and components of the electronic speed control have been designed and selected to provide long tube life. 7,000 to 10,000 hours is not an unusually long life for the tube.

LUBRICATE YOUR COIL WINDERS — PROPERLY

	1	2	3	4	5
Atlantic Refining Company, The	Gravity Spindle Oil	Ideal Oil F	Eureka Oil R	Atlantic Lubricant 37	Atlantic Lubricant 1
Esso Standard Oil Company	Esstic 42	Esstic 50	Cylesso T-140	Epic Lubricant 4F	Castroleum 1
Gulf Oil Corporation	Gulf Harmony Oil A	Gulf Harmony Oil C	Gulf Senate Cylinder Oil A	Gulf Legion Oil D	Gulf High Pressure Grease
Lubrx Products, Incorporated	Lubrx Spindle Oil #2	Lubrx 320 Oil #300	LubrxCyl #5-75	Cleavol G-500	Lubrx Cleavol Grease #2½
New York and New Jersey Lubricant Company	#1150 N.F.O. Lubricating Oil	"A-#90" Grade Non-Fluid Oil	"D-#19" Grade Non-Fluid Oil	"F-#51" Grade Non-Fluid Oil	"F-#4" Grade Non-Fluid Oil
Shell Oil Company	Vitrea Oil 23	Vitrea Oil 33	Vitrea Oil 79	Alvania Grease No. 1	Alvania Grease No. 3
Sinclair Refining Company	Lily White Oil C	Gascon B	Rubilene Oil Ultra Heavy	Sinclair Semifluid Grease Heavy	Opaline Pressure System Grease #1
Socony-Vacuum Oil Company Incorporated	Gargoyle Velocite Oil CA	Gargoyle Vactra Oil Heavy Medium	Gargoyle Cylinder Oil 600W	Gargoyle Grease #260	Gargoyle Grease Sovarex #1
Sun Oil Company	Sunvis #911	Sunvis #931	Sunvis #150	Sun #602 Grease	Gov't Mineral Lube Soft
Texas Company, The	Texaco Spindura Oil DD	Texaco Texol D	Texaco Texol K	Texaco Stazon CC	Texaco Star Grease #1
Tide Water Associated Oil Company	Tycol Alweave 4	Tycol Andarin 60	Tycol Apacyl 91	Tycol Akup C	Tycol Acylkup 10

The lubrication specifications given in our coil winding machine catalogs were worked out in collaboration with the various oil companies.

Recently we have learned that some oil distributors are not entirely familiar with these specifications, since most of the lubricants which they supply are identified by brand name only. As a result, some customers find it difficult to obtain the lubricant that corresponds to the specifications in our parts catalog.

To aid you in ordering *by brand name* the type of lubricant corresponding most closely to the particular characteristics required in each case, we have made up the table given here.

So, if you find it more convenient to specify a particular lubricant according to brand name, you can do this easily by comparing the specifications given in our catalog with the column headings in the table shown on this page.

Note that our specifications refer to lubricants as #1, 2, 3, 4 or 5. For example, our No. 102 Coil Winding Machine Parts Catalog specifies #1 lubricant. The various brand names applied to such an oil are listed in column No. 1 in the table and opposite the names of the oil companies that supply these lubricants.

HOW TO ADJUST WIRE LAYER LENGTH

No. 102 Leesona Coil Winder

Wire layer length of coils wound on the No. 102 Hi-Speed Coil Winder can be easily adjusted for any length between 1/16 in. and 2-13/16 in. without changing traverse cams.

This feature makes it unnecessary to stock a supply of cams.

How does the traverse mechanism work? How is it adjusted?

The traverse mechanism is actuated by a heart-shaped cam (A in Fig. 1) attached to the worm wheel (B). The worm wheel gets its motion from the worm (C) which is connected by gears to the driving shaft.

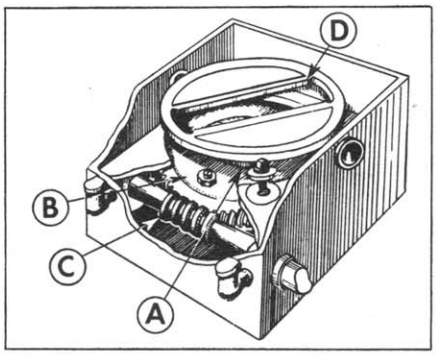


Fig. 1. No. 102 cam case without traverse bar and driver, showing exploded view of adjuster and worm wheel.

The cam accelerates a slide in the milled opening (D) that extends diagonally across a circular adjuster. This slide, in turn, imparts motion to the traverse bar driver (arrows in Fig. 2). This driver is connected to the traverse bar by the screw (E) or to the pinion (G in Fig. 3), depending on the length of wire layer desired.

With the arrangement shown in Fig. 2, the adjuster can be regulated (as described below) to obtain wire layer lengths from 1/16 in. to 1-1/2 in.

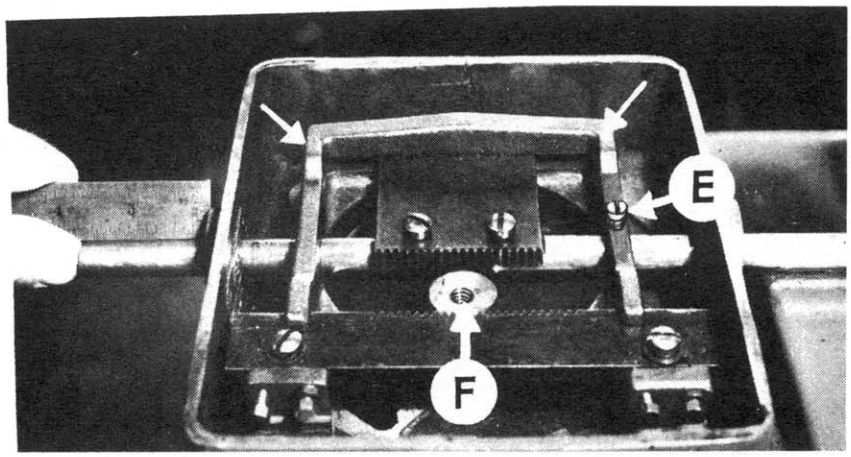


Fig. 2. Traverse bar driver in place. This set-up gives traverse lengths from 1/16 in. to 1-1/2 in.

However, for longer lengths, the tapped boss (F) in the traverse bar driver can be used for inserting the pinion (G) shown in Fig. 3. This meshes with two pinion racks. One rack is held stationary by two brackets in the gainer case; the other is attached to the traverse bar.

When the slide moves the traverse bar driver, the pinion rotates and imparts additional movement to the traverse bar. The combined movement imparted by the slide and pinion amounts to twice that imparted by the slide alone and permits adjustment to obtain wire layer lengths of from 1-1/2 in. to 2-13/16 in.

To obtain greater accuracy of wire-turn lay, the pinion must be removed for winding coils 1-1/2 in. or less in length, and the screw (E) used to secure the traverse bar driver to the traverse bar.

To change the traverse length, two adjuster screws (H—only one shown) are loosened and the adjuster rotated. When the milled slot in the adjuster is *parallel* with the direction of the traverse, maximum traverse length is obtained; when *perpendicular*, the traverse is zero. A small scale placed against the gainer case and traverse bar as shown in Fig. 2 can be used as a gauge to measure the length of the traverse stroke.

After the traverse has been set, the wire guides should be centered. To do this, stop the winder with the wire guides at the extreme end of a stroke and align the guide centers with the inside face of the nearest spool flange.

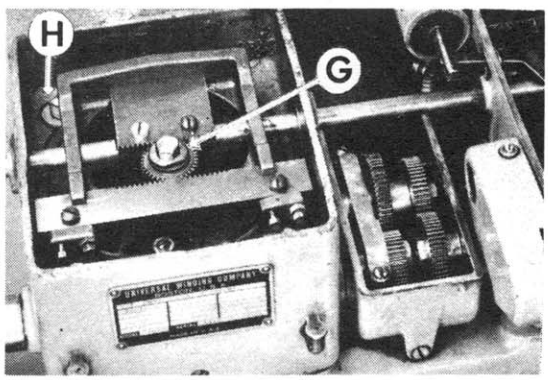


Fig. 3. With screw (E in Fig. 2) removed and pinion (G) in place, traverse length can be varied from 1-1/2 in. to 2-13/16 in.

NEW MARKING BLADE ATTACHMENT
Nos. 107 and 108 Coil Winders

When winding coils in stick form, it is common practice to separate the completed stick into individual coils after removing it from the winder.

Since the completed stick is often covered with an outer layer of insulating paper which hides the wire layers, it is desirable to mark the stick in order to locate the center point between the individual coils. This avoids the possibility of miscalculating and cutting into the wire layers when sawing the stick apart.

The most accurate and practical way to mark the completed stick is to use a series of keen-edged marking blades which make slight incisions between each coil on the stick *while* it is in the winding position.

A newly designed Marking Blade Attachment is being supplied with the No. 107 (automatic paper feed) and the No. 108 (manual paper feed) Leesona® Coil Winding Machines. Fig. 1 illustrates this attachment on the No. 107 Winder.

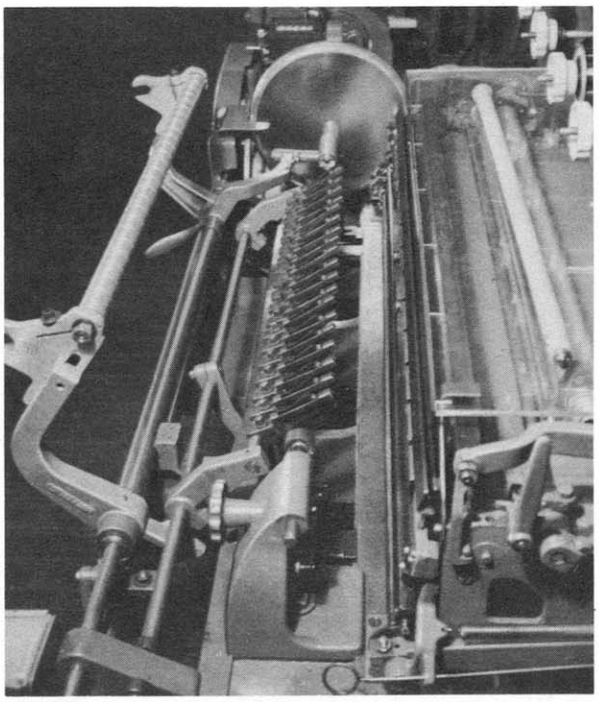


Fig. 1

The blade (A in Fig. 2) is single-edged and is attached to the holder (B) by two screws (C). One of the screws acts as a stop to prevent the guard (D) from exposing more of the blade than necessary.

Only half of the blade's cutting edge is used when marking the coil stick; consequently, when, in time, that part of the cutting edge in use becomes dull, the blade can be reversed in the holder to present the unused portion of the edge.

When not in use, the holders rest on the bed of the winder with the blades recessed into the holders to prevent injury to the operator.

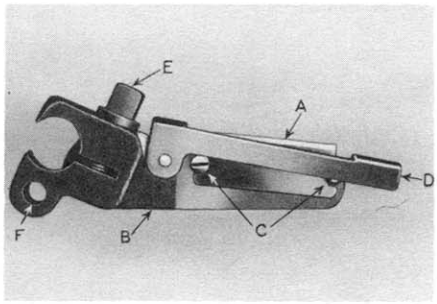


Fig. 2

A binder screw (E) clamps each holder firmly onto the marking blade shaft, and an aligning rod passing through the hole (F) in each holder assures perfect alignment and unison of action when marking.

The marking blade shaft is mounted in a pair of arms which, in turn, are mounted on another shaft. A handle on this latter shaft is used to operate the blades on the No. 107 Machine.

The attachment is similarly mounted on the No. 108 Coil Winder but is operated by a foot lever.

A suggested method for spacing the marking blades is to wind a few complete layers of wire, then stop the machine and use the partially-wound coils as gauges for locating the blades.

NEW GUIDE HOLDERS ADJUST THEMSELVES TO VARIATIONS IN COIL DIAMETERS

Now you can be sure of getting coils with uniform electrical characteristics by equipping the No. 84 Leesona 4-coil winding machine with new wire guide holders of the full-floating type.

Let's see why. As you know, the diameter of wire on any spool may vary slightly throughout its length. So, when you wind coils in groups, the variations in wire diameters can result in coils having varying outside diameters, especially when coils contain a relatively large number of turns.

That was true of No. 84 Leesona winders of an earlier design. Their wire guides were mounted on a rigidly held flat steel spring. Since all of the holders were attached to a common foundation, they could not move independently of one another.

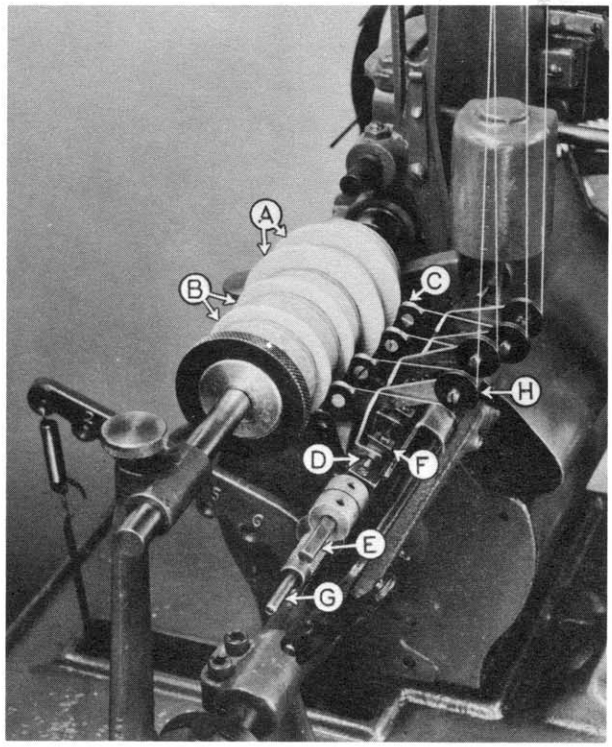
To overcome this condition, each wire guide should be able to adjust itself to the diameter of the coil it feeds. Yet, this adjustment must not affect the position of the other wire guides. That's the advantage you get from the new Universal wire guide holders with floating action.

Here's how the new floating type of guide holder works

It is so constructed that each wire guide (C) can move without affecting the others. This floating action is obtained by means of an elongated opening (D) in each wire guide holder. The "space adjuster" rod (E) passes through those openings and also through steel blocks (F) which prevent side play in the

wire guides. The main or "traverse guide holder rod" (G) acts as a fulcrum for the wire guide holder assemblies. As the wire passes partially around the auxiliary guide wheel (H) on the upper portion of the guide holder, enough tension is provided to keep each wire guide in contact with the surface of the coil.

The result? If one or more coils in a group increase in diameter over the other coils, the elongated opening in the guide holder allows the wire guide to float or move outward as much as $\frac{1}{8}$" without disturbing the other guides. Thus, you get coils with uniform electrical characteristics.



FLOATING ACTION keeps wire guides in close contact with "lattice-type" coils regardless of variations in coil diameters when No. 84 Leesona® Coil Winder is equipped with newly developed wire guide holders. This new development gives you coils with the uniformity you require for electronic applications. To demonstrate this point, coils marked "A" in photo were partially wound before coils labeled "B" were started. "A" coils are 2½" in outside diameter. "B" coils are 2¼" in diameter. Yet all guides remain in close contact with the surfaces of the coils.

HOW TO MAINTAIN ACCURATE PAPER FEED ON THE NO. 104 LEESONA® COIL WINDER

The paper-injecting mechanism of the No. 104 Leesona® Coil Winding Machine is carefully adjusted before shipment. With standard equipment, it automatically and accurately handles insulating paper .0006" to .002" thick.

For paper .0025" to .005" thick, you can get a Heavy Paper Attachment with roller elements.

In either case, the Feed Rolls are factory-set to open about .005" to .01". This allows glassine, Kraft, acetate film or other kinds of insulation to be pulled freely between the rolls while being measured.

To maintain the accuracy of paper feed featured in all No. 104 Coil Winders, you should make a periodic check of the clearances and adjustments that influence the way the paper is fed.

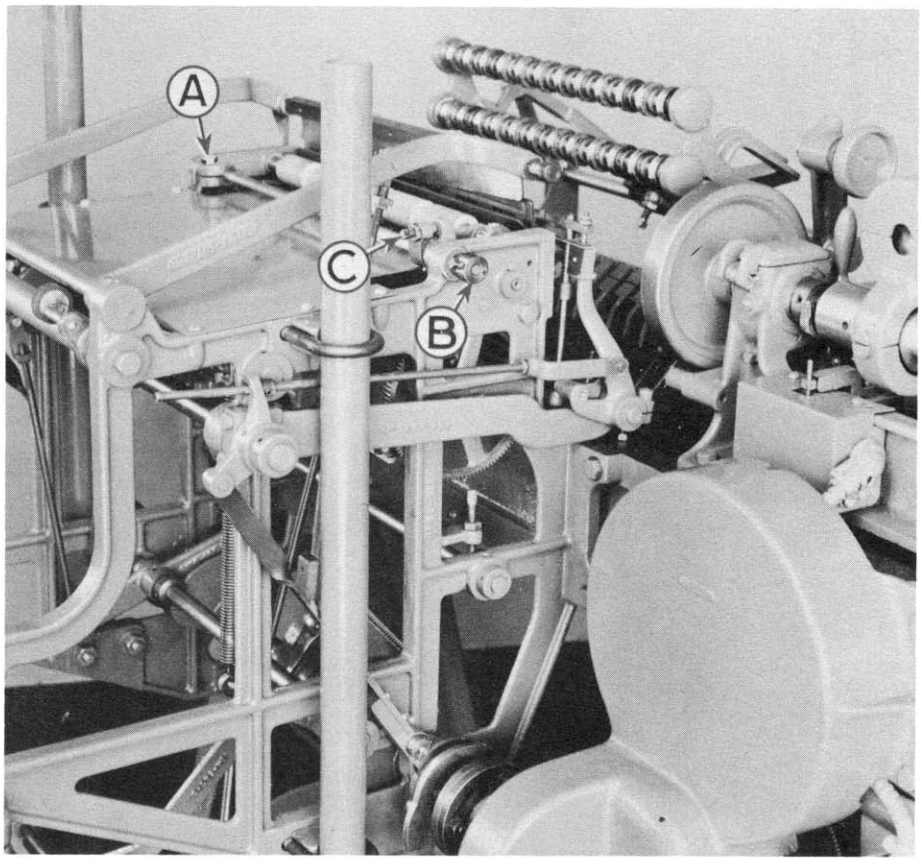
1. *First check* to make sure that the paper supply is centralized at the back of the machine. You can tell at a glance.

2. *Next, check the paper after it has passed through the delivery mechanism.* Pull it forward by hand to make sure that the Feed Rolls are gripping it uniformly throughout its entire width. The roll pressure is irregular if the paper can be pulled to one side or the other, or if it wrinkles.

3. *To correct irregular pressure,* loosen Screw "A" in the Feed Roll Arm. It's at the right-hand end of the Upper Feed Roll. Press down on the Feed Roll and tighten the screw. Test the paper again to make sure the adjustment is correct.

4. *If the pressure is uniform, but is too light or too heavy,* you can easily correct the condition. Just loosen Collar "B" on the end of the Feed Roll Arm Fulcrum. Then, turn the Collar clockwise to reduce pressure or counter-clockwise to increase pressure.

5. *Check the space between the rolls occasionally.* You can change the spacing by means of Screw "C" on the Feed Roll Arm. Turn this



IT'S EASY TO MAINTAIN ACCURATE PAPER FEED on the No. 104 Leesona Coil Winder. You make simple adjustments in the delivery mechanism at the three points keyed in the photograph. Just take the seven steps outlined on this page.

screw a very small amount only . . . never enough to allow the gears on the Rolls to unmesh.

6. *Be sure the Wire Guides are set absolutely parallel with the Winding Arbor.* If they aren't, a wire or wires at the end of the coil stick may grip the paper ahead of the others. This would cause the paper to "spiral" onto the coil stick.

7. *Check the rubber inserts in the Delivery Shelf occasionally.* After long use they may become smooth. When that happens, roughen them up with sandpaper. It's also a good idea, when the machine is not in operation, to set the Delivery Shelf back against the Frame. This frees the rubber inserts from contact with the Shelf and lengthens their life.

PRECISION SNAP-ACTION SWITCH FOR WIRE-BREAKAGE DETECTORS on Nos. 104, 107 and 108 Coil Winders

New Precision Snap-Action Switches for Wire-Breakage Detectors are not affected by vibration. They are now being supplied as standard equipment with Nos. 104, 107 and 108 Leesona Coil Winders.

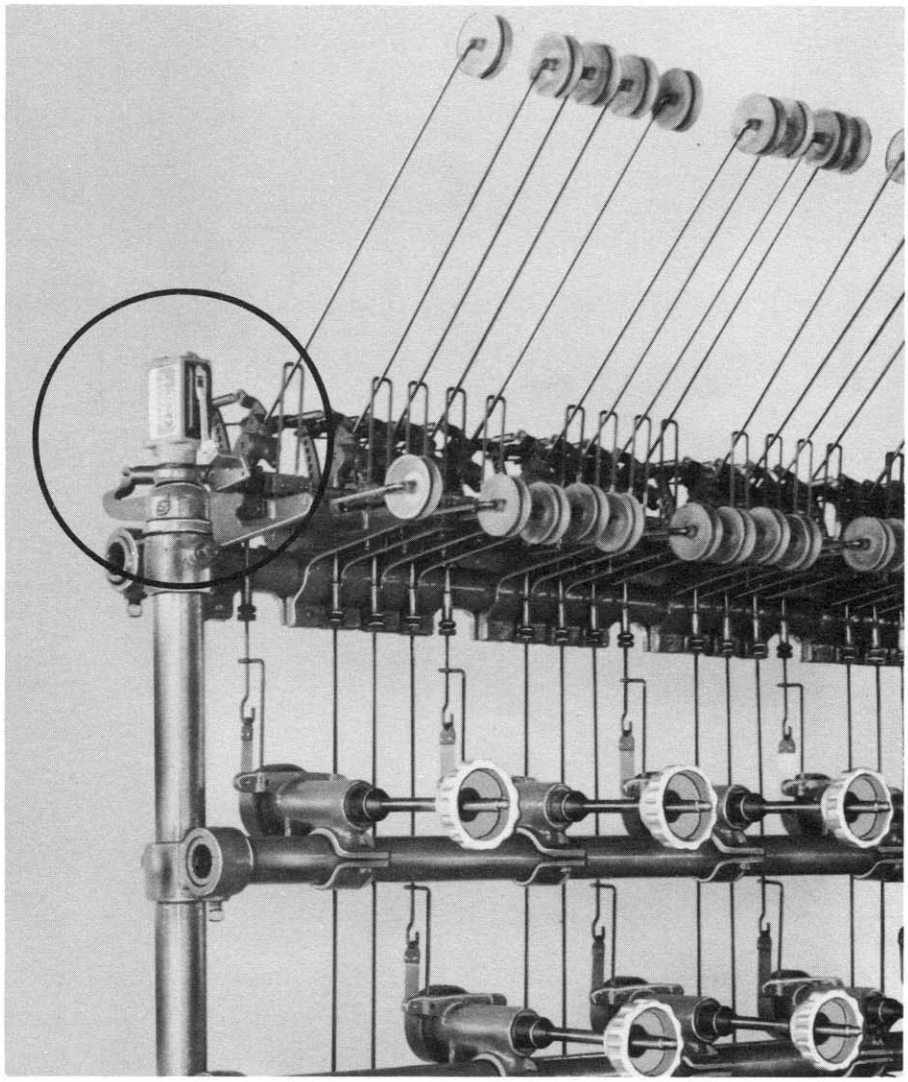
These vibration-proof switches guard against the unnecessary stoppages that occurred in plants where excessive floor vibration tended to agitate the mercury in the type of switch formerly used with the Wire-Breakage Detectors on Nos. 104, 107 and 108 Coil Winders.

The new Precision Snap-Action Switch is mounted on the wire-spool rack at the top of the left-hand "supply support."

Here's how it works. A roller contact on the switch is operated by a lever mounted on the end of a rod. Also attached to the rod are breakage levers for each tension "compensator." Each compensator projects through its own U-shaped breakage lever.

Now, whenever a runout (or a wire break) occurs, the released compensator rises. It strikes the breakage lever and tips it backwards. The breakage lever, then, rotates the rod on which it is mounted. The rod, in turn, presses the operating lever against the roller contact on the switch. This operates a solenoid coil and stops the winding machine. Sounds complicated, but it takes only a split second.

Nos. 104 and 107 Leesona Coil Winders are wired for use with a "normally open" switch; so, the roller contact closes the circuit to operate the solenoid. No. 108 Coil Winder, however, is wired for a closed circuit. Therefore, on this machine, the contact opens a relay to stop the winding machine.



NEW, PRECISION SNAP-ACTION SWITCH (circled) for Wire-Breakage Detectors on Nos. 104, 107 and 108 Leesona ® Coil Winders is not affected by vibration. So, it guards against unnecessary stoppages.

OVERCOMING FINE WIRE BREAKAGE WITH FELT STRIPS ON BRAKE BANDS

Felt strips attached to the inside surface of the brake band will do much to expedite the handling of fine wire sizes with the strap ten-

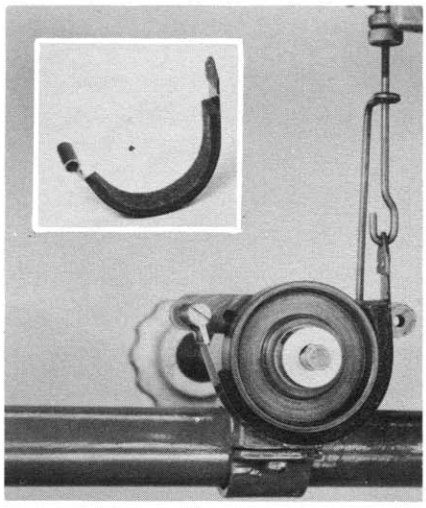


Fig. 1. Felt strips placed over metal brake band reduce fine wire breakage on coil winders equipped with strap-tensions. Optional on new winders; applicable to winders in use by slight adjustments.

sion on Universal Coil Winding Machines. Breakage is kept at a minimum.

The felt strips do not interfere with the quick, positive braking action but they *do* do away with the metal-on-metal impact of bare brake band and brake wheel which is apt to snap finer wire sizes.

These felt strips are offered as optional equipment on new coil winders utilizing strap-type tension. In addition, they can be used on existing winders of this type with a few minor adjustments to compensate for the added thickness of the felt. The adjustments are made by (1) raising the supply support bar $\frac{3}{8}$ to $\frac{1}{2}$ inch and (2) resetting the brake connecting rods.

OVER-END TENSION WITH PLASTIC ANTI-BALLOON CONES, No. 102 Coil Winders

Bobbin inertia in unrolling delivery is overcome in the No. 102 Coil Winder by an over-end tension device. Here the wire is drawn over the head of a stationary supply spool, cutting to a minimum the chance of snagging as it balloons off the supply spool.

The plastic anti-balloon cone also makes possible more compact grouping when winding two coils per head on the No. 102.

With this tension the wire is delivered from the supply spool through a plastic balloon guard then through a pinch-type felt cleaner, next it passes around a capstan wheel, to which is attached a brake drum for controlling tension. The wire then passes off the capstan wheel and over a compensator, from which it travels to the traverse guide of the winding machine.

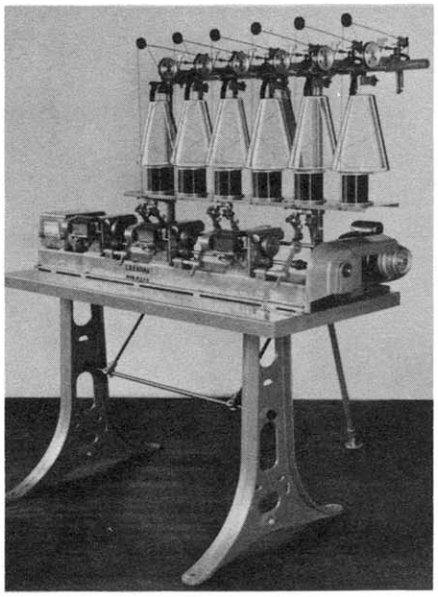


Fig. 2. Over-end tension with plastic anti-balloon cones. This eliminates problem of bobbin inertia as wire passes through winding process.

A braking force applied to the capstan wheel is controlled by the compensator in order to provide uniform tension at the winding arbor.

The capstan wheel, running in a ball bearing, is made of aluminum; the felt fingers for cleaning are spring-loaded so as to apply a slight tension for snubbing the wire around the capstan.

HOW TO MAKE SET-UP CHANGES QUICKLY No. 108 COIL WINDER

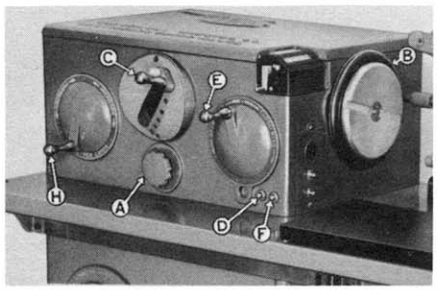


Fig. 1

It is very easy to change the set-up on the No. 108 Coil Winder from one specification to another while seated at the machine.-You don't have to remove or replace any gears or cams. This is how you do it —

1. First, set the range selector for the wire size to be wound.

Pull out the range selector knob (A, Fig. 1) and turn it toward the range for the wire size to be wound. At the same time, slowly turn the handwheel (B) until the pin on the inside face of the knob drops into the locating hole.

2. Pull out the wire size selector handle (C) and move it until it is opposite the number on the plate that corresponds to the wire size called for in the specifications. Set the handle in the locating hole. To do this, it may be necessary to rotate the handwheel (B) slowly until the handle drops into the locating hole.

3. Start the machine. Press the left-hand rapid traverse button (D) and stop the traverse just before it reaches "0" on the scale (G, Fig. 3). Then turn the handwheel (B) away from you until the indicator lights change (I, Fig. 2).

4. Next, turn the "open wind close wind" handle (E) as far as it will go toward "open" *without forcing it.*

5. If the new specification calls for a coil with a longer winding length than the previous specification, turn the handle (H) "turns per layer" toward increase to make up the difference. You will learn quickly from experience just how many turns are necessary. However, it generally takes at least one complete turn to make up for each $\frac{1}{8}$" difference in the winding lengths.

If the new specification calls for a shorter winding length, omit this step.

6. Set all the white dials on the counter at "0" and the silvered dials for the total turns in the coil. Then run the machine until the counters register the number of turns *per layer* required.

If the traverse reverses — Lights (I)

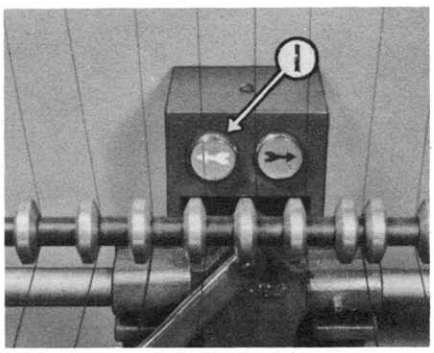


Fig. 2

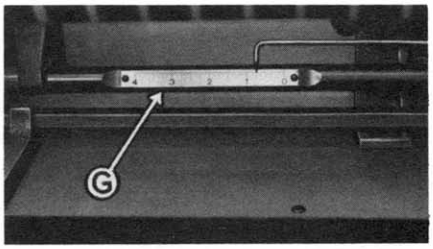


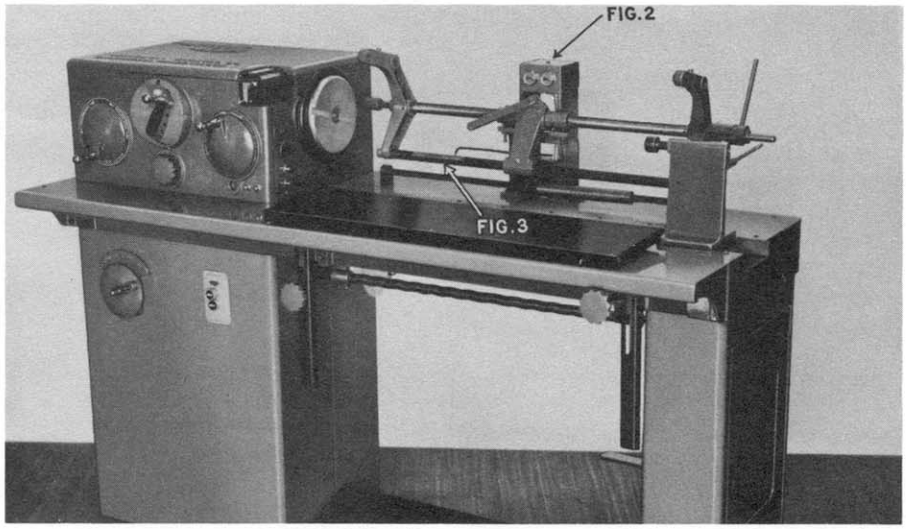
Fig. 3

change — before the counter registers the desired number of turns *per layer*, turn handle (H) toward increase to extend the winding length, reset the traverse at "0" on the scale as described in step 3; then repeat this step.

7. Rotate the handle (H) toward decrease until the light changes.

8. Turn the handle (E) toward "close wind" until the pointer registers the desired layer length on the scale (G, Fig. 3). This completes the set-up.

As a check on the accuracy of turns per layer, you should turn the counter back to "0"; run the machine until the indicator light changes, and take another counter reading. If any minor corrections for turns per layer are necessary, they can be made with the handle (H).



No. 108 Coil Winder

HOW TO ADJUST ARBOR ACCELERATION RATE ON THE NO. 107 COIL WINDER

Universal No. 107 Coil Winders are equipped with an electronic speed control that starts the winding arbor slowly, to prevent wire breakage, and then gradually accelerates it to full pre-set speed.

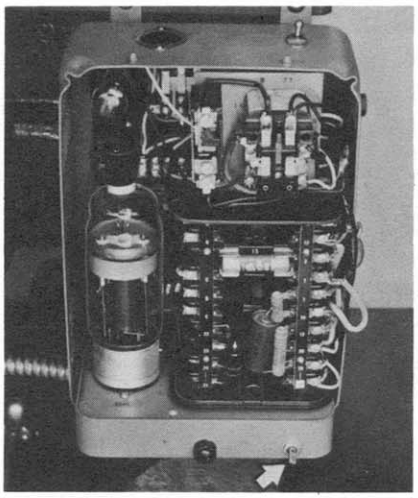


Fig. 1. Electronic speed control unit on the Universal No. 107 Coil Winder, shown with housing cover removed. Arrow points to rheostat by which acceleration rate is adjusted.

The rate of acceleration is adjustable. From a production standpoint it is naturally desirable to speed up the arbor as quickly as possible. However, the wire size dictates the safe maximum rate of acceleration, because accelerating the arbor too fast for a particular wire diameter will cause wire breakage.

The adjustment is made inside the electronic speed control housing so the power to the machine should always be shut off before removing the housing cover.

The adjuster itself is a rheostat located at the lower right-hand corner of the speed control housing, as indicated by the arrow in the accompanying illustration. On some No. 107 Coil Winders equipped with a different style control housing, the rheostat is located near the upper right-hand corner. Turning the rheostat clockwise increases the time required for acceleration to full speed.

SETTING COUNTERS ON THE HI-SPEED NO. 102 COIL WINDER

On the Hi-Speed No. 102 Coil Winder each winding head is automatically controlled by an electrically operated counter, which — at the end of a predetermined number of turns — acts to disengage the clutch.

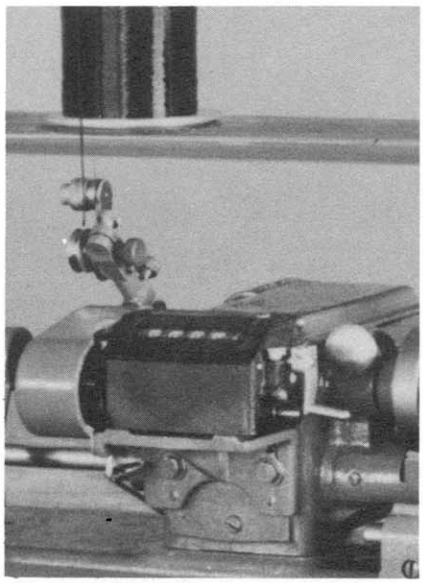


Fig. 2. Close-up of a counter on the No. 102.

These automatic counters register only once for every two turns of wire wound onto the coil. The reason for this is to keep the counter parts from wearing excessively because of the high speed at which this coil winder runs. When setting the counters on a Hi-Speed No. 102 — that is, a No. 102 coil winder bearing serial No. 945 or higher — the counters should be set for exactly one-half the total number of turns required.

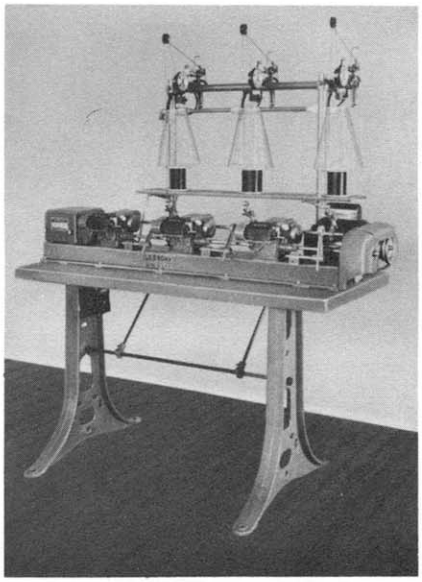


Fig. 3. A Universal Hi-Speed No. 102 Coil Winder.

For example, if the total turns are to be 1200, the silvered dials on the counter should be set for 600.

HOW TO GET GREATER ACCURACY IN CROSS-WOUND COILS

Cross-wound coils used in television and radio transmitting and receiving apparatus, or for general electronic purposes, must be produced with extreme accuracy in order to insure the required coil efficiency and uniformity.

On the Universal No. 84 Coil Winder, the wire guide traverse rod — (A) in Fig. 1 — screws into a slide (B) which is reciprocated by the traverse cam. When new, the rod fits very snugly in the slide. However, we have found that the rapid reciprocating motion sometimes causes the rod to loosen slightly in the slide after the machine has been in operation for a long time. This creates a slight amount of end-play in the wire guide assembly. A set screw (C) is now employed in the end of the slide to take up any end-play that may develop.

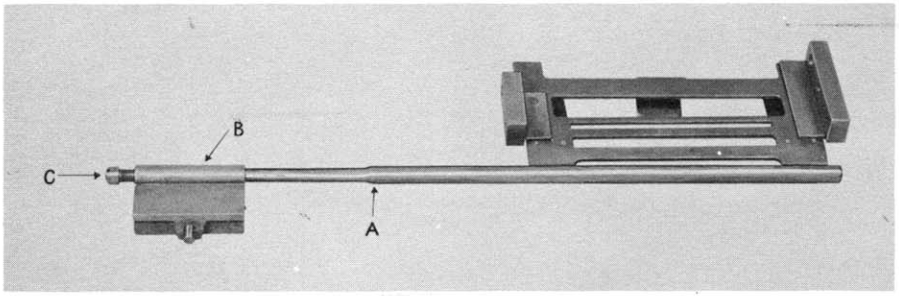


Fig. 1

Especially important is the accuracy with which the wire guides traverse back and forth to lay the wire in the coil. Any end-play in the wire guide traverse rod that transmits motion from the traverse cam to the guides may disrupt the wire spacing or throw the wire over the sides of the coil.

A simple way to determine whether or not there is end-play in the wire guide holder assembly is to stop the machine and try to move the guides back and forth as shown in Fig. 2. If there is any noticeable movement, and there appears to be end-play in the wire guide holder assembly, the set screw should be tightened.

This screw (84B-767) can also be furnished for application to older No. 84 Winders. On these machines, it is necessary to cut 5/16″ off the threaded end of the rod so that the screw can be inserted into the traverse slide.

MOLDED NEOPRENE BRAKE BANDS No. 102 Overend Tension

Molded Neoprene brake bands are now standard equipment on the overend tensions.

The Neoprene brake bands, which replace the rubber bands formerly used, are much more durable and are not subject to deterioration caused by the oil which is usually present on enamel and formex-covered wires.

Molded to conform to the contour of the grooved tension wheel, the Neoprene brake band can be easily installed.

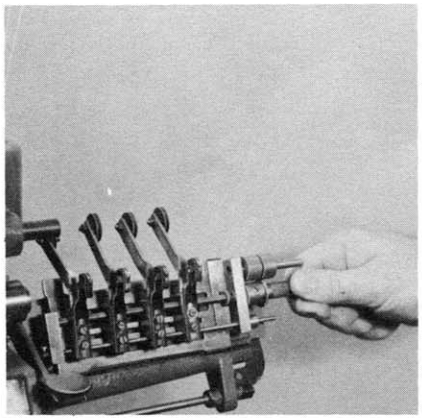


Fig. 2

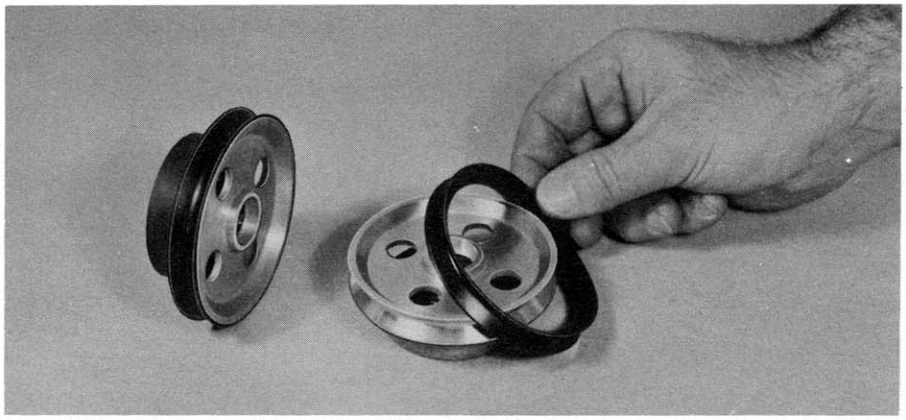


Fig. 3

How To Distinguish "Head Wind" from "After Wind" On the No. 84 Coil Winder

The Universal No. 84 Coil Winder is designed to wind each turn of wire in the coil at an angle that causes the preceding turn, over which it crosses, to be bound firmly in place. The result is a self-supporting coil — one that doesn't require a flanged arbor of paper insulation between layers for support.

What is meant by the term "winds"? This term is often used in reference to Universal type coils wound on the No. 84 Coil Winder. It refers to the number of complete turns of wire wound around the arbor while the wire guide is making one traverse across the coil. How is this number determined? It is equal to the number of revolutions made by the arbor during one stroke of the wire guide. For example, if the arbor makes two revolutions while the wire guide is moving from one side of the coil to the other, the coil will contain two winds. Or, in the case of fractional winds, ¼ wind will occur when the arbor rotates once while the guide makes four strokes across the coil — two in one direction and two in the other.

What actuates the wire guides? A traverse cam, driven from the spindle by means of a gear train and "gainer mechanism", actuates the wire guide. The "gainer mech-

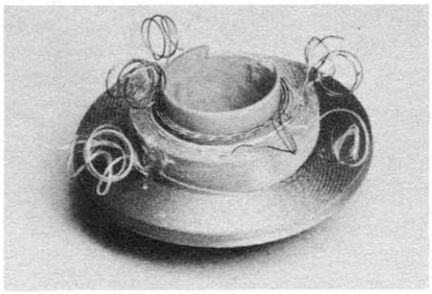


Fig. 1. Television "horizontal sweep" (fly-back) coil wound on Universal's No. 84 Coil Winder.

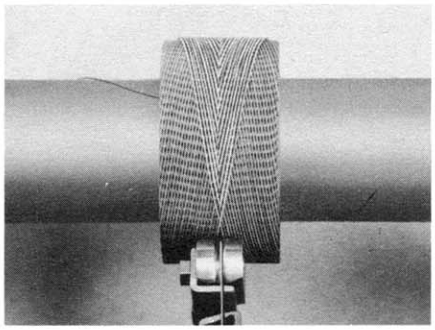


Fig. 2. This is "head wind". Wire guide is moving to the right. Apex of angle formed by the top layer of wire points down toward the wire guide and each turn is laid ahead of the preceding one.

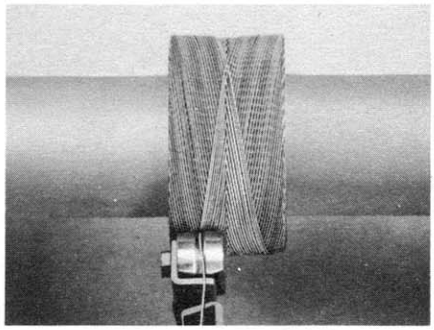


Fig. 3. This is "after wind". The wire guide is moving to the right. Observe that each turn is laid behind the preceding one and that the apex of the angle formed by the top layer is pointing upward away from the guide.

anism" is used to change the ratio between the speeds of the arbor and cam so that it will not be exact. If, for instance, the arbor revolved exactly four times faster than the cam, each series of wire turns wound around the coil during one stroke of the wire guide would lay exactly on top of the turns wound by the preceding stroke. In this case, of course, the coil would not be acceptable. The "gainer mechanism" changes the ratio just enough to make the turns of wire wound during one stroke of the guide fall slightly ahead of, or behind, the turns wound during the preceding one.

What is "head wind"? This occurs when the turns wound by each succeeding stroke of the guide lie slightly ahead of the preceding series.

When "head wind" exists, the actual speed ratio of the traverse cam to the arbor is slightly less than the theoretical ratio and the wire is reversed at the end of the traverse before it crosses over the previous turn. For instance, "head wind" occurs if the machine is set up to produce two winds with the gearing and "gainer mechanism" so arranged that only 1.98 turns develop.

"After-wind" is the opposite of "head wind". When the actual speed ratio is more than the theoretical ratio, each series of wire turns wound around the coil during one stroke of the guide lies slightly behind the series wound during the preceding stroke. The wire crosses over the previous turn before it reaches the end of the traverse and is reversed. For example, if 2.02 winds develop when the theoretical number of winds is two, "after wind" occurs.

How can you distinguish "head wind" from "after wind"? This is easily done by noticing the direction in which the angles, formed by the top layer of wire, are pointing. When "head wind" is used the angles point toward the wire guide. With "after wind," they point upward away from the guide. When the coil is off the arbor, this method of identification can also be used. Just remember that the arbor rotates in a clockwise direction.

How To Apply Either "Head Wind" or "After Wind" To the No. 84 Coil Winder

Opinions vary as to which type, "head" or "after wind", gives the best results. "Head wind" is most commonly used and all No. 84 Coil Winders shipped from our plant are set up for it, unless "after wind" is specifically called for.

When winding slippery enamel wire that does not form a clearly

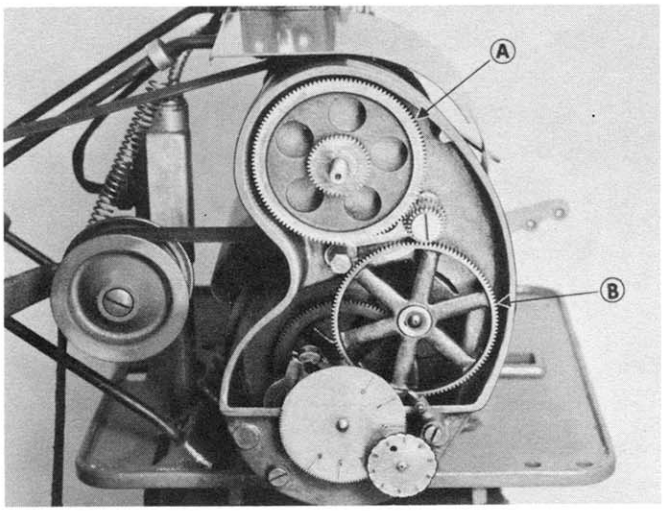


Fig. 1. This is the No. 84 Coil Winder gear case showing spindle and clutch gears. To change from "head wind" to "after wind", remove spindle gear (A) and substitute a spindle gear with one or two teeth less when the number of winds in the coil is one or more. If the number of winds is less than one, remove clutch gear (B) and substitute a clutch gear with one or two teeth less.

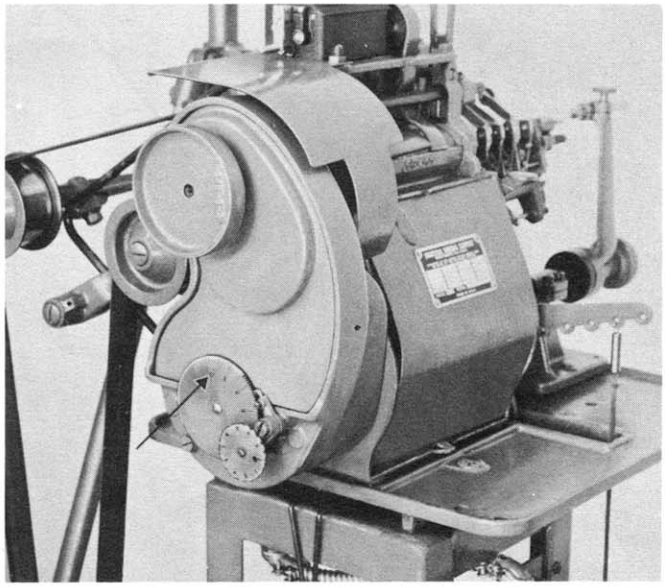


Fig. 2. Gainer adjuster for opening and closing the wire lay on the No. 84 Coil Winder. "O" on the adjuster dial is the extreme closed position with "head wind" and the extreme open position for "after wind".

defined pattern with "head wind", it may be advisable to change to "after wind"

"Head wind" is preferred by some for narrow-length coils on the contention that it prevents dropped turns which are most apt to occur on these coils. However, if dropped turns do occur, it would be advisable to decrease the number of winds as this will increase the angle of wind and help to overcome the condition.

To change from "head wind" to "after wind" when the number of winds is one or more: —

deduct one or two teeth from the spindle or top gear.

If the number of winds is less than one: —

deduct one or two teeth from the clutch or bottom gear.

To change from "after wind" to "head wind" when the number of winds is one or more: —

add one or two teeth to the spindle gear.

If the number of winds is less than one: —

add one or two teeth to the clutch gear.

The number of teeth to be added or deducted will depend on the wire size and spacing required.

It should be noted that when the winder is set up for "head wind", the gainer adjuster must be turned upward from "zero" to open the wire lay, "zero" being the extreme closed position. When "after wind" is used, "zero" becomes the extreme open position; consequently, the adjuster should be turned in the opposite direction — down toward "zero" to open the wire lay.

HOW TO TRANSFER ARBORS ON THE NO. 107 COIL WINDER

Arbor transfer supports on the Universal No. 107 Coil Winder assure greater accuracy when transferring wires from the finished coil stick to a new one.

Through use of the transfer supports, all of the wires can be transferred simultaneously. Also, they can be re-indexed to the same position at the start of each coil stick.

The recommended procedure for transferring arbors consists of the 12 steps described and illustrated here.

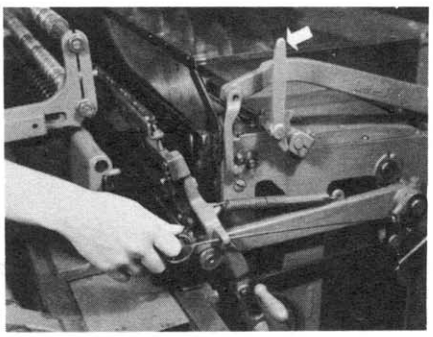


Fig. 1

1. While the last layer of wire is being wound, pull the feed roll lever (arrow) forward to stop the paper feed mechanism.

2. After the last layer has been wound and the winder has stopped automatically, pull the shelf release rod forward. This allows the shelf to return to its neutral position.

3. Tape the finished coil stick.

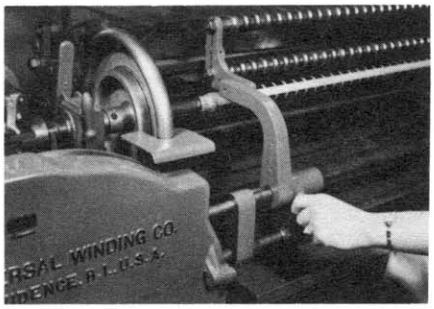


Fig. 2

4. Disengage the clutch, depress the traverse driving handle and move the wire guide support assembly to right or left to bring wires into the margins between coils.

5. Turn the handwheel until a few turns of wire are wound in the margins. If marking blades are used the coils should be marked at this stage of the transfer.

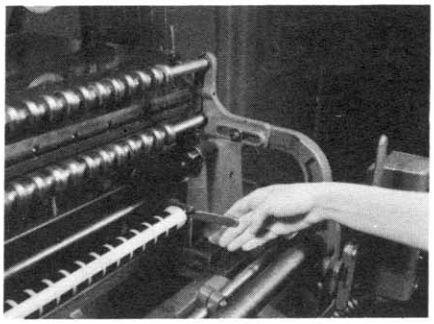


Fig. 3

6. Remove the completed coil stick and place it in transfer supports.

7. Allow the completed coil stick to rotate in the brackets and unwind a few turns to relieve the tension on the wires. Press the handle on the right hand arbor transfer support lightly against the end of the arbor to prevent it from turning too rapidly.

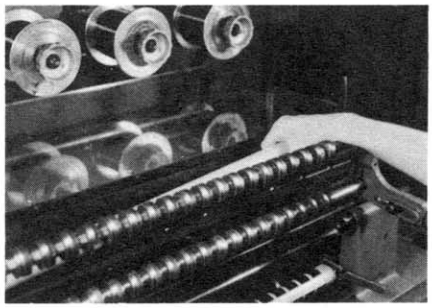


Fig. 4

8. Insert the new arbor in back of the wires and in the winding position.

9. Tape the wires to the new arbor; they will be located in the margins or paper extension on each coil.

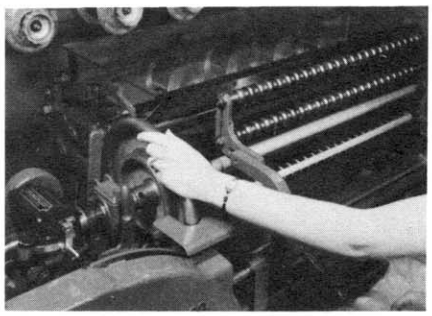


Fig. 5

10. Cut the wires, then turn the handwheel until one or two turns are wound. This prevents the wires from pulling out from under the tape and also locates them for lead attaching. Next move the wire guides back into their normal winding position.

11. Engage the clutch, "zero" the counter and pull the elevation control return handle as far forward as it will go.

12. Flip the feed roll lifter back to its regular winding position and start winding.

TIPS ON THE USE AND SELECTION OF INSULATING PAPER

Storage and Care of Paper — Coil winders Nos. 104 and 107

1. Do not remove the waterproof wrapper in which the paper is shipped until you are ready to use the paper.

2. If you have to store a partly used roll, wrap it in waterproof paper and, if possible, place it where the relative humidity is around 45–50 %.

3. Stand the roll on end when storing it. If it lies on its side it may be pushed out of shape and cause trouble in the winding operation.

4. Remove several yards of paper from the roll before starting a winder that has been idle overnight or for any longer period of time. Paper in the feeding mechanism becomes "set" when the machine stands idle for long pericds.

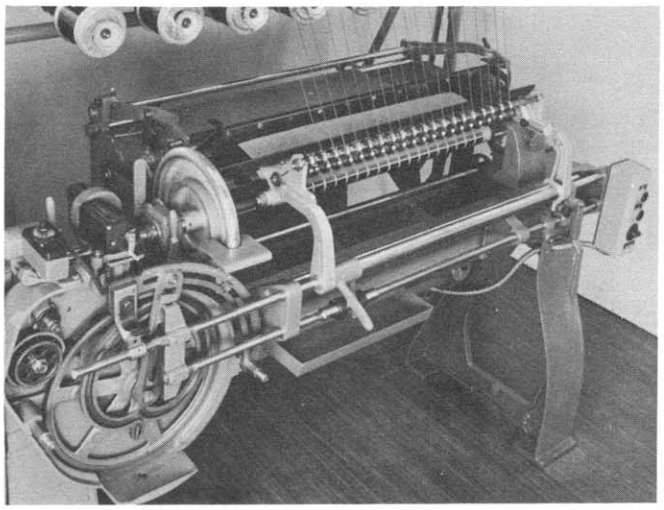
5. Paper that has become wrinkled from excess moisture can be straightened out with some success by mounting a lamp over the roll while it is on the winder. The heat from the lamp dries the outside layer and penetrates through to the inside ones as well. While a 200 Watt lamp may be used, an infrared is better. The lamp should be left on until the imperfections disappear.

Proper Thickness of Paper — Coil Winders Nos. 104, 107, 108

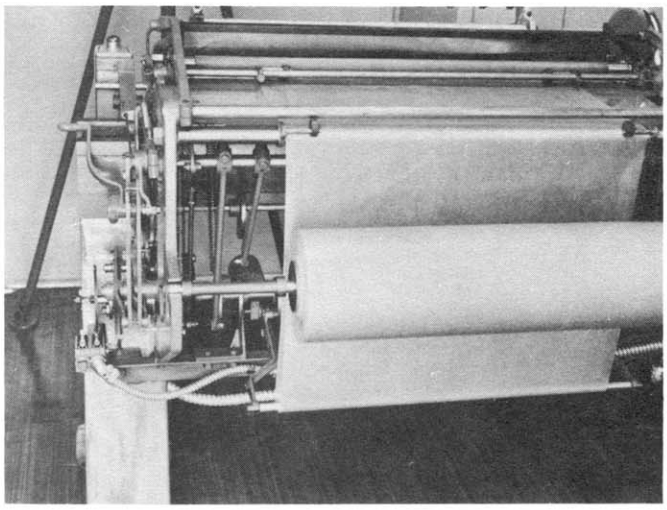
On the Universal Nos. 104, 107 and 108 Coil Winders the thickness of insulating paper that should be used depends largely on the wire size. If the paper used with a particular wire size is too thin, the wire will break through it.

Following is a table of wire sizes showing the recommended thickness of the layer insulation for each size.

WIRE SIZE B & S GAUGE	THICKNESS OF LAYER INSULATION
19	.007″
20	.005″
21	.005″
22	.005″
23	.005″
24	.002″
25	.002″
26	.002″
27	.002″
28	.0015″
29	.0015″
30	.0015″
31	.0015″
32	.0013″
33	.0013″
34	.001″
35	.001″
36	.001″
37	.001″
38	.001″
39	.0007″
40	.0007″
41	.0007″
42	.0005″



A Universal No. 107 Coil Winder, showing paper feed mechanism.



The paper supply on a No. 107 Coil Winder.

HOW TO TAKE OUT A TAP ON THE NO. 108 COIL WINDER

On certain coils now being wound on the No. 108 Coil Winder, it is sometimes necessary to take out a tap on a primary or secondary section after a predetermined number of turns are wound. This can be done very easily on the No. 108, and after the tapped turns are anchored, winding can be started at any desired point on the wire layer.

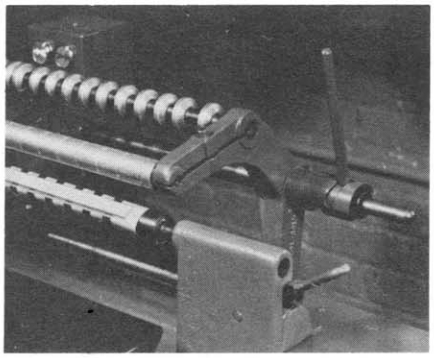


Fig. 1

The procedure for taking out a tap may vary in different plants, but here is one method that is commonly used:

As shown in Fig. 1, the coil stick is taped after the predetermined number of turns is reached.

If, for example, the tap is taken out at the center of the wire layer, as shown in the illustration, the wire guides are brought to the end of the layer by pressing the rapid traverse button. Then they are car-

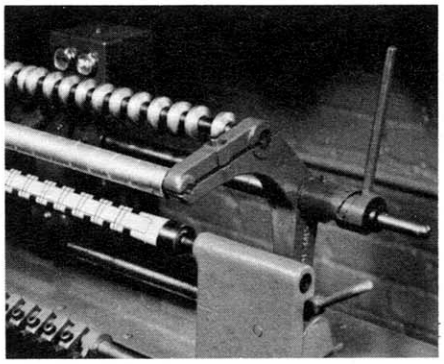


Fig. 2

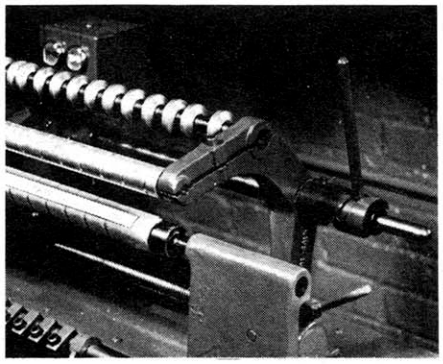


Fig. 3

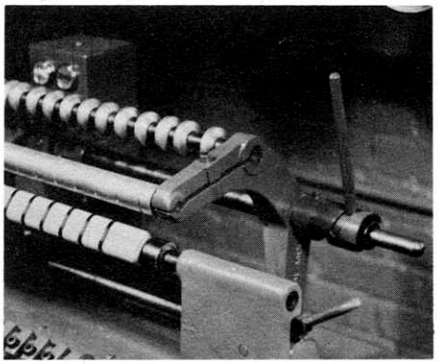


Fig. 4

ried out into the margin by moving the margin cam lever.

The next step is to set the master ratio knob at neutral, so that the traverse mechanism will be inoperative while the turns for taps or leads are being wound.

After the required number of tap turns are wound, as in Fig. 2, the margin cam lever is returned to neutral and the master ratio knob re-set to its former position.

Now a sheet of insulating paper is inserted and another strip of tape placed on the coil stick. Fig. 3 shows how this strip of tape is put on with the gummed side up and the ends folded under to hold it in place on the coil stick.

This method of taping anchors the wire layers so that when the lead or tap turns are pulled out of the margin, after the coil stick is cut apart, the remaining turns in the wire layer will not be pulled out with them.

Finally, if it is desired to resume winding at the center of the layer, the position of the pointer on the scale should be noted at the time the final turn preceding the tap is wound. Then (Fig. 4), the wire guides can be rapid-traversed to the other end of the layer and back again toward the center until the pointer is at the position noted. Another sheet of insulating paper will have to be inserted after the wires are spiralled back to the starting point.

GEAR CHANGING SIMPLIFIED ON NO. 102 COIL WINDER

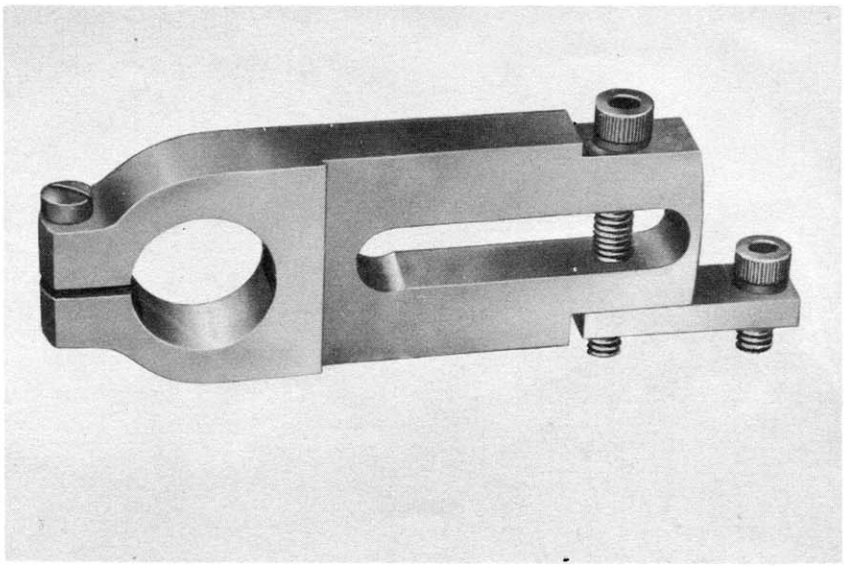


Fig. 1

New change gear arm which simplifies gear changing on the No. 102 Coil Winder. This new arm can easily be applied to No. 102 Coil Winders presently equipped with the older type.

A new change gear arm (fig. 1) makes gear changing on the No. 102 Coil Winder much easier.

This arm is located in the auxiliary gear head which makes it possible to obtain any number of turns from 10 to 900 per layer on the No. 102. It can be swung upward to lift the gears out of case for removal.

Unlike its obsolete counterpart the new change gear arm clears the traverse bar and can be swung up into a vertical position giving ample working room to change gears quickly and easily. With this new arm gears can be changed in a few minutes.

This is how you change gears with the new arm:

1. After removing the auxiliary gear case cover remove nuts (A, fig. 2).

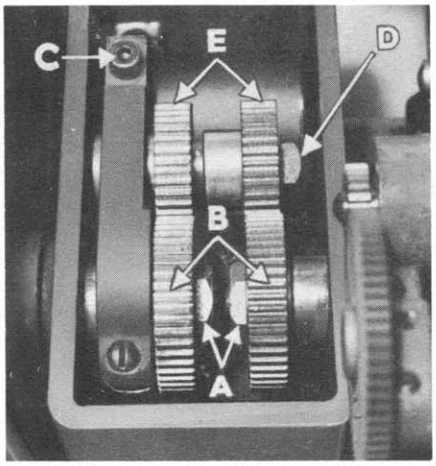


Fig. 2

Closeup of gear case with cover removed shows (A) nuts; (B) gears; (C) screw; (D) gear stud; (E) gears.

2. Partly withdraw the worm shaft which can be reached at the left hand side of the cam case (not shown). Replace gears (B) with new change gears; tighten nuts (A).

3. Retract screw (C) and loosen gear stud (D) this allows you to:

   (a) raise the change gear arm as shown in fig. 3. Notice that the traverse bar doesn't have to be removed even for the largest gears.

   (b) replace gears (E), lower the change gear arm into the case and tighten screw (C).

4. Mesh gears and tighten stud (D).

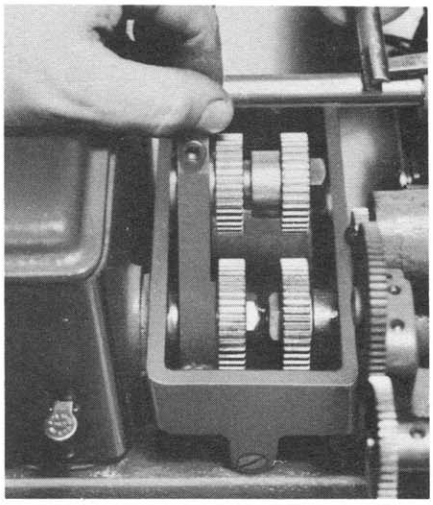


Fig. 3

Raising gear arm.

New Direct Drive Assures Greater Range of Performance on No. 108 Universal Coil Winder

Universal's No. 108 Coil Winder now has as standard equipment a direct drive from an adjustable speed motor. This drive assures greater pulling power for winding heavy wires. With it the winding arbor can be started and stopped more smoothly on both fine and coarse wires.

In winding heavy wire sizes, there is a tendency for the backward pull of the tensions to rotate the arbor in a reverse direction when the winding is completed. As the new direct drive utilizes a positive braking action on the motor, this reverse rotation is eliminated. At the same time, by releasing the brake through the foot treadle, it is possible for the operator to manually rotate the winding arbor for positioning of leads, etc. This brake is operated through a solenoid and is adjustable by means of a turnbuckle so that an abrupt or gradual stop of the winding arbor can be provided.

Through this foot treadle, and the direct drive, the operator has complete control at all times over the winding speed. A slight pressure on the foot treadle will rotate the arbor as slowly and smoothly as desired, and as this pressure is increased, the winding speed is accelerated until it reaches the maximum required for the size of wire being wound. Furthermore, this control permits ready deceleration of the winding speed to facilitate the manual insertion of insulating paper when this retarding is required.

In connection with this adjustable speed motor, a pair of three step, toothed pulleys and a positive drive belt permit three separate operating ranges with speeds up to 2500 R.P.M.

In addition to the improved control featured by this new drive, it is now possible to handle much heavier wire sizes and in fact, ten coils at once have been wound on a 3″ x 1½″ square tube using #17 wire (.0453″ bare diameter). At the same time, the finer sizes of wire are handled with equal facility.

Many users of the old style clutch-type drive have purchased a conversion package from us enabling them to convert to the new style direct drive. This conversion unit is so designed that the change-over can readily be made by the user on his own premises. Complete instructions and wiring diagrams are included.

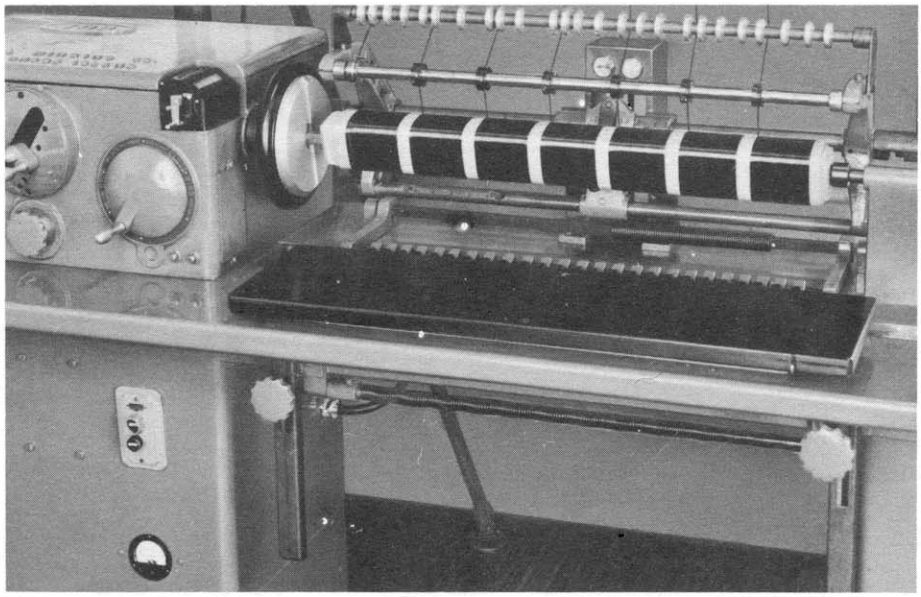


Fig. 1. Positive braking action of direct drive prevents reverse rotating of arbor when winding heavy wires.

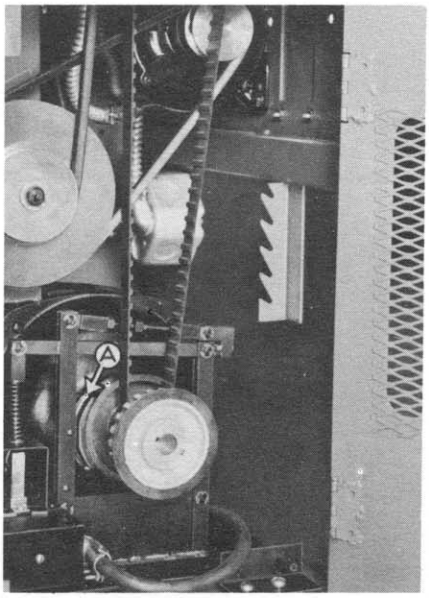


Fig. 2. View of direct drive motor, positive drive belt, toothed drive pulley and solenoid-operated brake (A).

NEW OVEREND TENSION FOR WINDING FINE WIRES IN MULTIPLE

Recent Universal development permits faster operation, cuts down breakage

Fig. 1 shows a new overend tension for winding fine wires — No. 40-50 AWG — in multiple. A typical Universal development to improve coil winding, it allows higher winding speeds and reduces wire breakage at the start of winding. Because it enables the fine wires to be taken off overend there is no spool inertia to overcome when starting to wind.

Tension is applied by a compensator wheel which can be set for various amounts by an adjustment that changes the degree of drag on the wheel. The compensator arm to which the wheel is attached provides a means of taking up the wire slack that occurs after a coil has been wound and the arbor stops turning.

This compact tension is mounted on a swivel so that it can be adjusted easily to line up the compensator wheel with the angle at which the wire leads into the coil. The entire tension assembly can also be adjusted to locate it at any position, from horizontal to vertical, that is most satisfactory for the particular grouping employed.

A transparent container for the supply spool also serves as a balloon guard and allows the spool to be checked visually to see if the supply is running out.

To insert a new spool in the container and thread the wire through the tension:

1. *Raise the two tension leaves, then insert the spool in the container as shown in Fig. 2.*
2. *Pull down the leaf "B" and lay the wire over the top of the felt pre-tension pad from rear to front as shown in Fig. 3.*
3. *Drop leaf "A" so that wire is held between the two pre-tension pads.*
4. *Bring the wire up and over the compensator wheel "C" (Fig. 4) from rear to front.*
5. *Connect the wire to the tube or coil form and it is ready to run.*

To increase the amount of tension lower the nut "D"; raise it to decrease the tension.

To adjust the force of the compensator arm during winding, change the position of spring "E" on tab "F". Adjust the tension on spring "E" so that the compensator arm moves forward to its front position just before wheel "C" starts to turn.

The new overend tension can be used with Universal's Nos. 102, 104, 107 and 108 Coil Winders and also on other makes of coil winding machines.

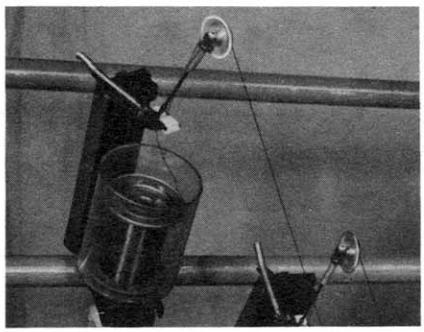


Fig. 1

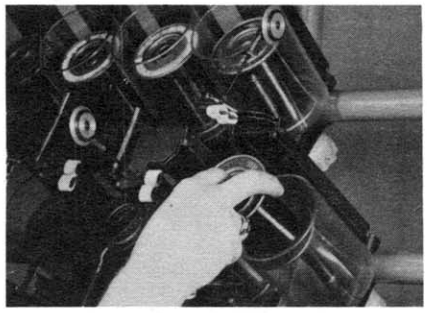


Fig. 2

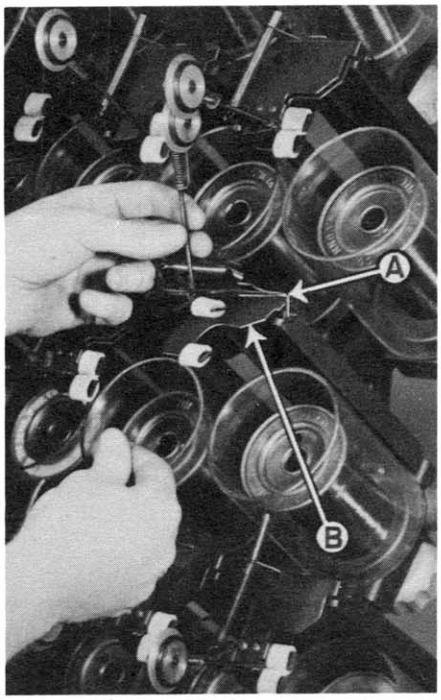


Fig. 3

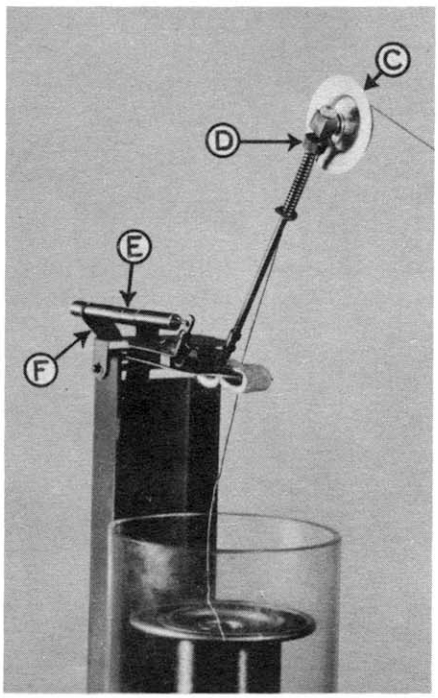


Fig. 4

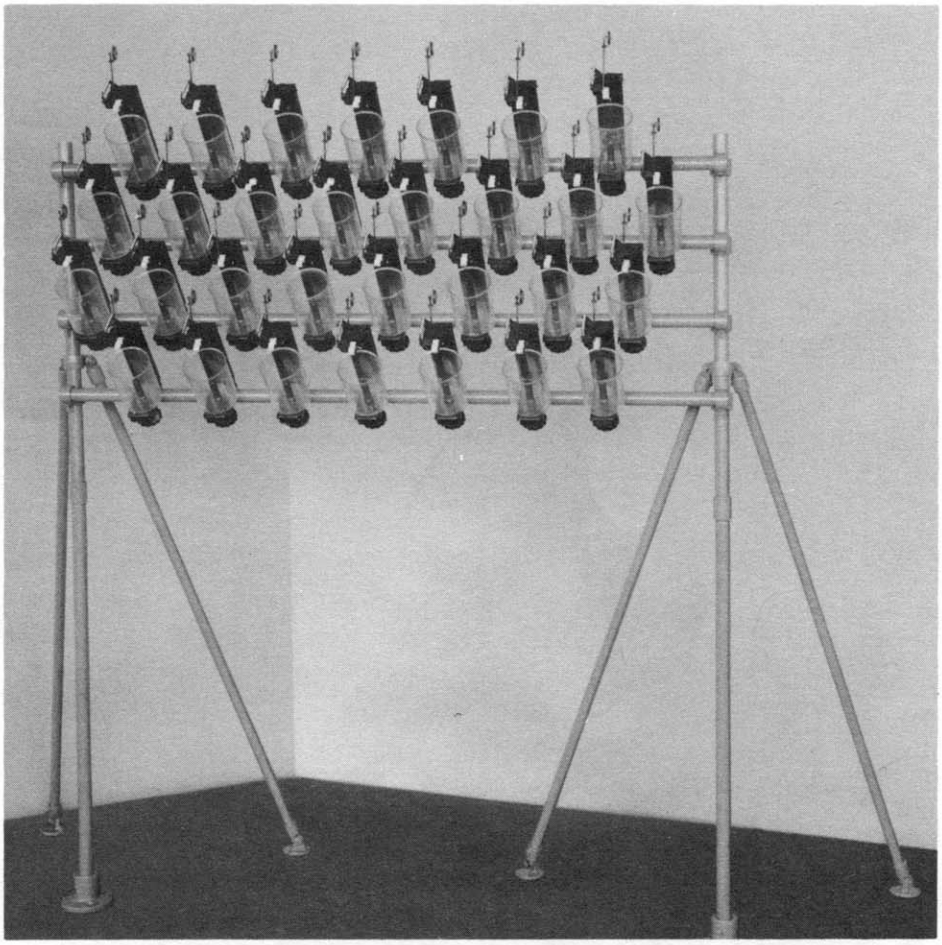
LOADING TIME CUT BY USE OF TWO OR MORE LEESONA® SPOOL RACKS

Combined with tensions and spool-holders in self-supporting units, they speed production in Leesona and other winders

The combination of wire-spool holders and tensions with the supporting foundation or rack may be considered an integral part of Leesona No. 104, 107 and 108 machines, or as a separate piece of equipment that can be used with machines of either our own or other make. As a matter of fact, all our wire-spool racks and tensions are crated and shipped as separate assemblies and installed as independently-supported units in relation to the coil winder with which they are used.

The principal reason for utilizing Leesona wire-spool racks and tensions as a combined, self-supporting item is to prevent possible machine vibration being transmitted to the wire supply. Another big ad-

vantage is the ability to utilize two or more sets of wire-spool racks with the same coil winding machine, thereby facilitating the use of different sizes of wire in a single coil specification without continual adjusting and reloading of tensions. This arrangement is particularly advantageous on small transformers specifying three or more sections, all of which employ a different size of wire. The racks and tensions involved can be loaded remotely while the machine is operating on one coil section, and transferred to the winding position for subsequent coil sections with little loss of time. Several plants using this principle have developed a "dolly" arrangement to support the complete wire-spool rack, and utilize a brake to stabilize the entire tension assembly while the coils are in production.



A recent development, our single-unit overend tension for fine wires, lends itself admirably to compact grouping for a large number of wire spools. The illustration shows the complete rack fitted with 30 of these tensions. Note how accessible all wire-spools are to the operator — so that, if a transfer system such as the one described is not feasible, the spools can still be replaced with a minimum of effort and time.

UNIVERSAL WINDING COMPANY

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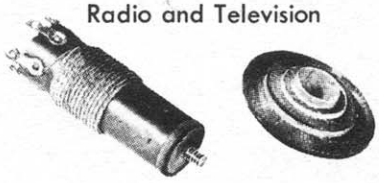
A Wide Range of Winding Machines for a Wide Range of Coils

We invite you to visit our Coil Winding Demonstration Room to view any of these machines in operation.

"LATTICE-TYPE" COILS

Radio and Television



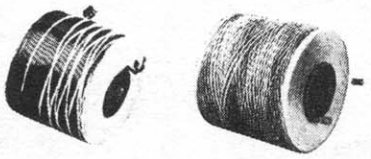
No. 84 Winding Machine

Model	Wire Range	Max. Dia.	Traverse	RPM	Coils at Once	HP	Floor Space
84	#19-42	5"	1/32"-1½"	400-1000	1, 2, 3 or 4	¼	26" x 31"

"Gainer mechanism" and calibrated "strap-type" tensions insure accurate, uniform winding, also quick change-over. Simple design, rugged construction assure long life.

LAYER-WOUND COILS

Cotton-Interwoven or Non-Insulated



Nos. 96 and 103 Winding Machines

Model	Wire Range	Max. Dia.	Traverse	RPM	Coils at Once	HP	Floor Space
96	#19 to 46	6"	1/16"-3¼"	500-1800	1 or 2	¼	30" x 26"
103	#19-38, 46	7"	½"-8"	200-1200	1 or 2	½	40" x 36"

Wire and cotton mechanically guided. Automatic counter. Quick change-over. Adjustable for wide range of coil sizes.

GUTTER-WOUND COILS

for Heavy Duty

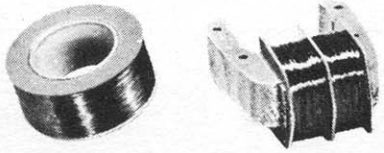
No. 98 Winding Machine

Model	Wire Range	Max. Dia.	Traverse	RPM	Coils at Once	HP	Floor Space
98	#8-20, 30	16½"	¼"-12"	35-135	1 or 2	¾	4'9" x 3'10"

Automatic guiding. Wire turns placed in grooves formed by preceding layers—for maximum density. Automatic stop at end of coil or end of each layer, as required.

SPOOL-WOUND COILS

No Insulation Between Layers



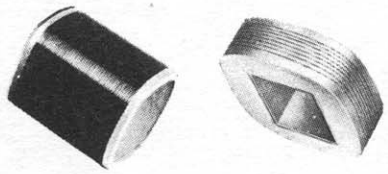
No. 102 High Speed Winding Machine

Model	Wire Range	Max. Dia.	Traverse	RPM	Coils at Once	HP	Floor Space
102	#19-46	3¼"	1/16"-2⅞"	500-5000	1 Per Head	½	51" x 24" (3 heads)

3 individually operated winding heads. Output is synchronized on basis of handling time per coil. Wire-layer length quickly adjusted. Automatic stop.

PAPER-INSULATED COILS

In Stick Form



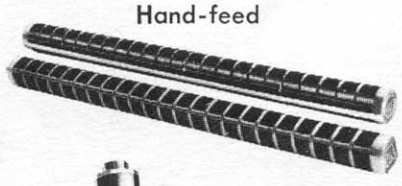
Nos. 104 and 107 (Automatic Feed) Winding Machines

Model	Wire Range	Max. Dia.	Traverse	RPM	Coils at Once	HP	Floor Space
104	#19-42	4½"	1/16"-5"	500-2500	3 to 14	½	48" x 35"
107	#19-42	4½"	1/16"-5"	500-3000	10-28	1	76" x 42"

Coils wound in stick form—3 to 14 on No. 104; 10 to 28 on No. 107. Sensitive "strap-type" tensions insure smooth flow of finest wires. Paper or acetate sheet automatically inserted. Uniform overlap at all diameters. Adjustable traverse mechanism. Automatic stop. Rapid transfer of wire turns.

PAPER-INSULATED COILS

Hand-feed



No. 108 Stick Winder — modern - - - flexible

Model	Wire Range	Max. Dia.	Traverse	RPM	Coils at Once	HP	Floor Space
108	#19-42	5"	5/16"-4"	400-2600	4 to 30	½	72" x 36"

Manually-operated machine designed for production & job work. Quick set-up. Maximum flexibility. Dial control of adjustments. Strap tensions. Round or rectangular coils. ½ in. min. inside diameter with 24-in. paper.

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