May 31, 1932. C. H. THORDARSON 1,861,037

MECHANISM FOR SLITTING AND WINDING PAPER AND METAL RIBBONS INTO COILS

Filed May 29, 1930 2 Sheets-Sheet 1

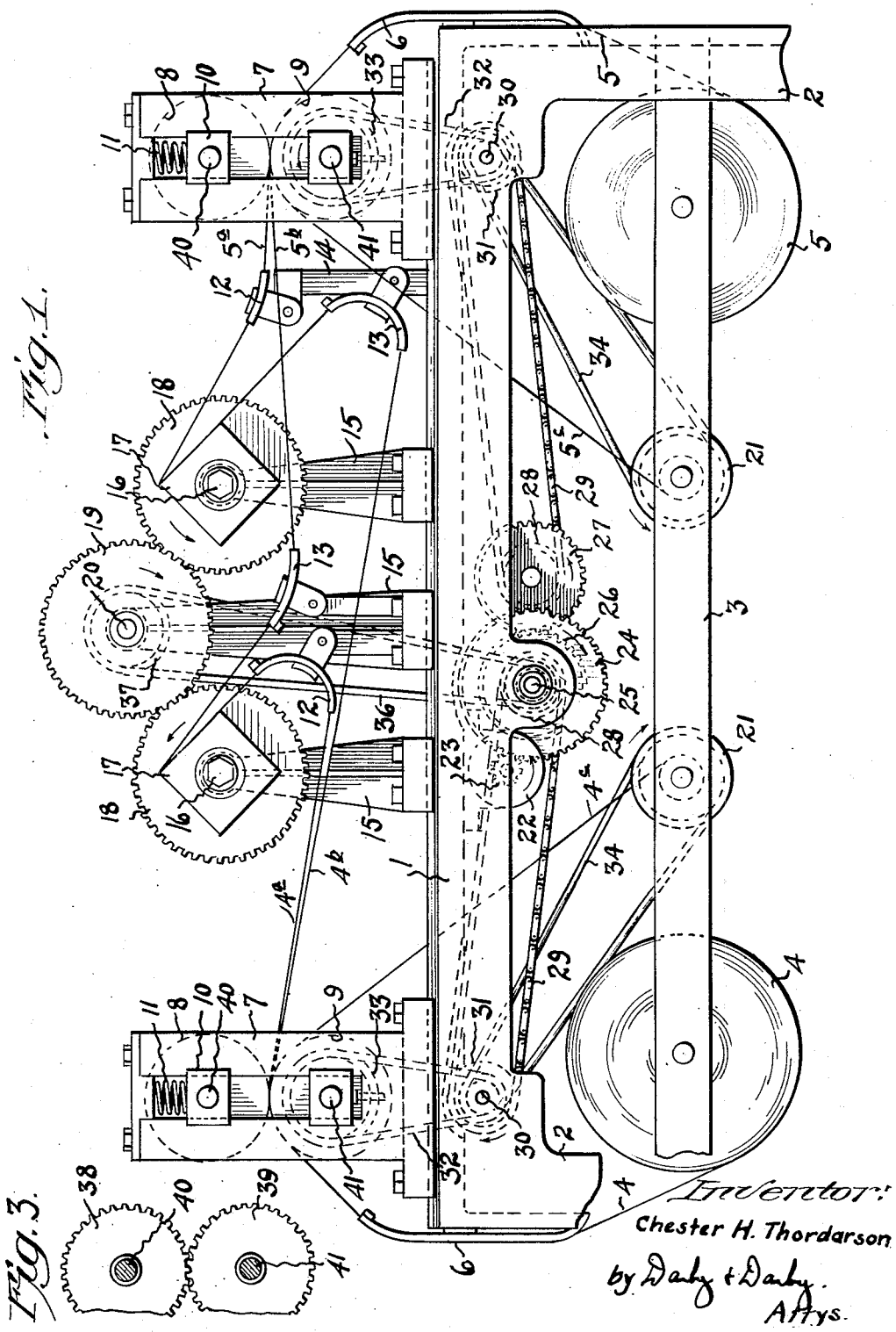


Fig. 1.



Fig. 3.

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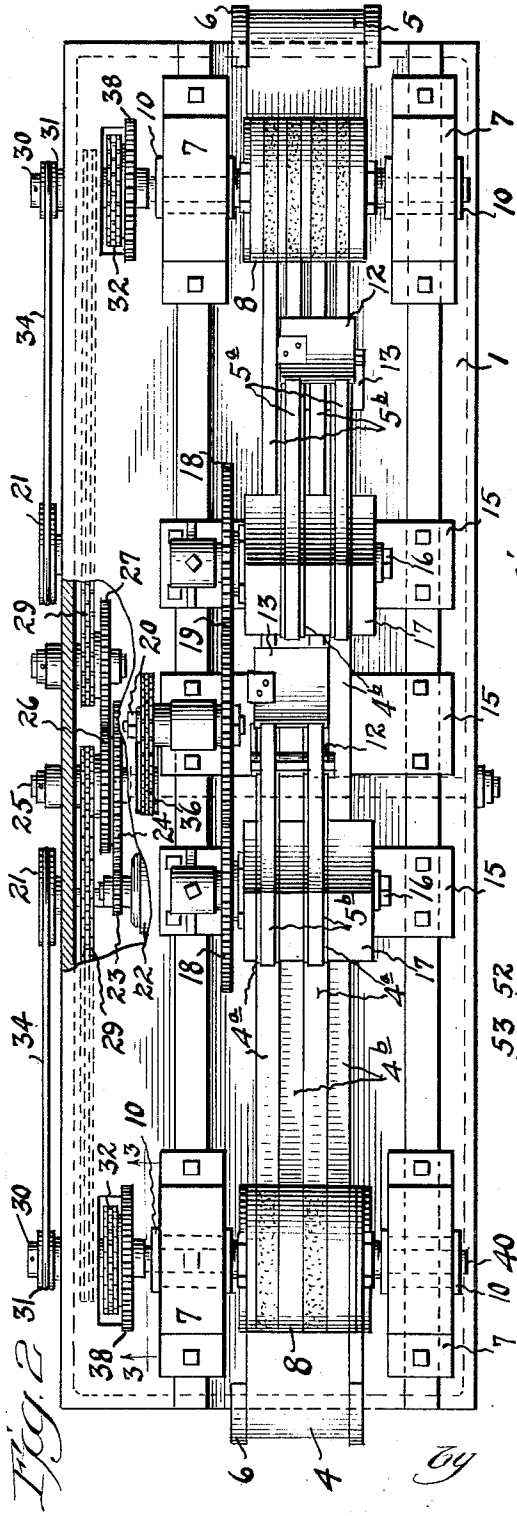


Fig. 2

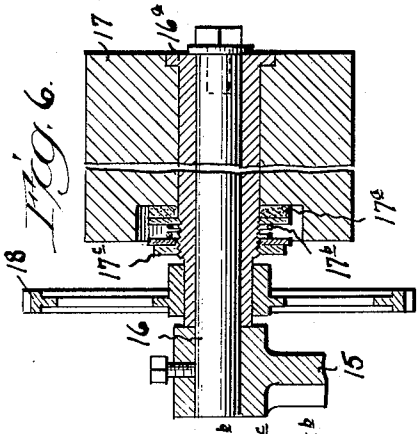


Fig. 6.

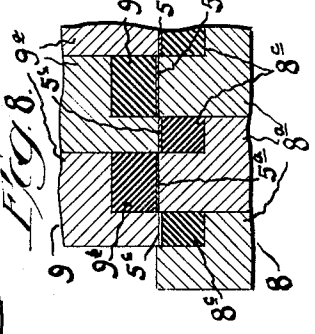


Fig. 8.

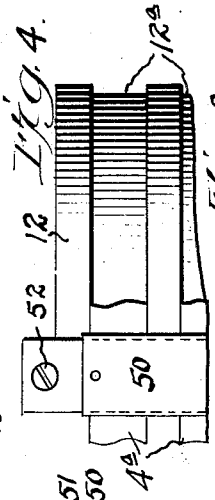


Fig. 4.

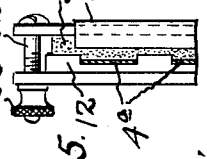


Fig. 5.

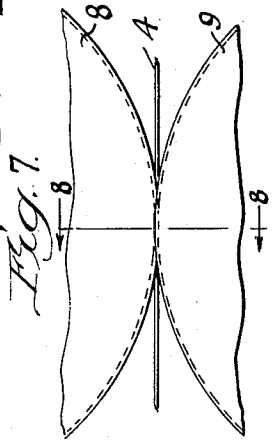


Fig. 7.

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Patented May 31, 1932 1,861,037

# UNITED STATES PATENT OFFICE

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## MECHANISM FOR SLITTING AND WINDING PAPER AND METAL RIBBONS INTO COILS

Application filed May 29, 1930. Serial No. 456,869.

This invention relates in general to machines of the type employed for winding electric coils comprising thin continuous strips of metal supported by a layer of a continuous strip of insulating material such as paper.

One of the objects of this invention is the provision of a mechanism by means of which coils of this type may be rapidly and accurately manufactured.

Another object of this invention is the provision of a machine by means of which a plurality of coils may be made simultaneously with strips of material and insulating paper which have been slit from wider strips of metal and insulating paper.

A further object of this invention is the provision in mechanism of this type of means for guiding the slit strips of metal and paper and for holding them when they are severed after the completion of the coils.

A still further object of this invention is the provision in an apparatus of this type of means for slitting wide strips of metal and insulating paper into narrower strips of the required width.

An additional object of the invention is to provide winding forms mounted so that they may slip the required amount as the coils are built up in diameter.

These and other objects as will appear from the following disclosure are secured by means of this invention.

This invention resides substantially in the combination, construction, arrangement and relative location of parts as will be set forth in detail hereinafter.

Referring to the drawings:

Figure 1 is a side elevational view of the machine of this invention with the supporting legs broken away;

Fig. 2 is a top plan view of the machine with a portion of the bed-plate broken away;

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged plan view of one of the strip guides and means for gripping the strips to prevent them from slipping when they are severed;

Fig. 5 is an end elevational view of Fig. 4 showing the gripping means;

Fig. 6 is a longitudinal central cross-sectional view of a winding form and its friction clutch;

Fig. 7 is an enlarged detailed end view of the slitting holes;

Fig. 8 is a cross-sectional view taken on the line 8—8 of Fig. 7.

The machine as disclosed in the drawings comprises a bed-plate 1 supported by standards 2 between which extend the cross-brace or support 3. Mounted on the cross-brace 3 on studs so as to be freely rotatable thereon are the rolls of paper and metal strip 4 and 5 respectively. At each end is provided a guide 6 for the strips. Mounted adjacent these guides near each end of the machine are the standards 7 on which are rotatably mounted on spindles 40 and 41 the rolls 8 and 9 which together provide the slitting means. Spindle 40 is mounted in heads 10 which are slidably associated with the standards and urged in a downward direction by means of springs 11. By means of this construction the roll 8 is forced with a yielding pressure towards and against the lower roll 9. As is apparent from Figure 1 the machine is substantially identical in construction on each side of the vertical central line, the only material difference being in the arrangement of the cutters of the slitting rolls as will be described later.

At 12 and 13 are guides for the paper and metal strips. Two of these guides are mounted on the central standard 15 while the other two are mounted on a standard 14. Supported on the two standards 15 adjacent the central standard 15 on spindles 16 so as to be freely rotatable thereon are the winding forms 17. Secured to these winding forms for rotation therewith are the gear wheels 18 both of which mesh with a gear wheel 19 rotatably supported on the spindle 20.

When the metal and paper strips are slit a continuous trimming is formed which is wound up into rolls on the spools 21. At 22 is the power device, in this case an electric motor, by which means the apparatus is driven. This motor is provided with a spur

gear 23 which meshes with the gear wheel 24 mounted on shaft 25. Also mounted on this shaft is a gear wheel 26 which in turn meshes with the gear wheel 27. Gear wheel 27 drives the sprocket wheel 28 which engages and drives a sprocket wheel 31 on spindle 30 by means of the sprocket chain 29. A second sprocket wheel, not shown, is mounted on spindle 30 for rotation with sprocket wheel 31 and drives sprocket wheel 33 through sprocket chain 32. Sprocket wheel 33 is connected to spindle 41 by means of which the drum 9 is driven. As set forth in Fig. 3 spindle 41 is also provided with a gear wheel 39 which meshes with a gear wheel 38 secured to spindle 40 by means of which the drum 8 is driven. A similar sprocket wheel 28 is mounted on shaft 25 so that the left hand set of rolls is driven by means of a similar sprocket chain 29. Also mounted on shafts 30 are pulleys by means of which spools 21 are driven through the belts 34. Also secured to shaft 25 is a pulley by means of which the pulley 37 is driven through the agency of the belt 36. By this arrangement gear wheel 19 and the driven gears 18 are rotated and with them the winding forms 17. These various features will readily be understood from Figs. 1, 2 and 3.

The winding form is clearly illustrated in Fig. 6. The spindle 16 is secured in bracket 15 in any suitable manner and has mounted thereon for rotation a sleeve $16^a$. The gear wheel 18 is connected to the spindle $16^a$ and acts to rotate it on the spindle. Freely mounted on the sleeve $16^a$ for rotation thereon is the winding form 17 which is normally driven by the spindle by means of a friction clutch. This clutch comprises a friction member $17^a$ engaging with the winding form 17 under the pressure of the spring $17^b$ which abuts against the stop $17^c$ secured to the sleeve. By means of this construction as the coil grows larger the winding form may slip so that the strips are not put under too great a tension or pulled apart. This is necessary since the slitting rolls and the winding forms run at a uniform speed so that as the coil builds up the winding forms must be able to slip.

The guides 12 and 13 are substantially the same in construction and as shown in Fig. 4 are provided with grooves $12^a$ in which the strips may move and be guided. Each one is provided with a reislient gripping means for holding the strips in place when they are severed after the completion of a coil. This gripping means comprises a transverse bar 50 which holds a felt or other suitable yielding shoe 51 against the strips through the agency of the screws 52 and pressure adjusting nuts 53.

The construction of the sleeve rolls is particularly clear in Fig. 8. Each roll 8 and 9 is composed of a number of cylindrical sections $8^a$ and $9^a$ respectively. Each section is provided with a circumferential groove as shown. In each section $8^a$ in the groove formed therein is a cylindrical steel cutting ring $8^c$, and similarly in each section $9^a$ in the grooves formed therein are the cylindrical cutting rings $9^b$. When the parts are assembled as shown in Fig. 8 the edges of the rings fall adjacent each other to form shearing edges to separate the wider strip of paper or metal into separate strips. The only difference between the sets of rolls at each end of the machine is found in the arrangement of these cutting rings. Thus for the paper slitting rolls the strip of paper as it comes from the roll 4 is slit into four separate strips of equal width as shown in Figure 1 and indicated at $4^a$ and $4^b$. A narrow strip of trimming $4^c$ is left which is rolled up on the left hand spool 21. The metal slitting rolls at the right hand end of the machine have a different arrangement of cutting rings as is set forth clearly in Fig. 8 so that four strips of metal $5^a$ and $5^b$ are narrower in width than the strips $4^a$ and $4^b$ of paper. These metal strips $5^a$ and $5^b$ are separated as shown in Fig. 1 and as a result three other strips of metal $5^c$ are formed which are in the nature of trimmings and are wound up on spool 21. Thus for both sets of slitting rolls the construction is the same but the arrangement of the cutting rings is different with regard to their transverse width.

As shown in Fig. 1 the strips $4^a$ of paper are wound up on to the left hand winding form 17 going through the left hand guide 12. Coming from the right hand end of the machine through guides 13 are the metal strips $5^b$ which wind up on the paper so that a coil is formed comprising alternate strips of paper and metal. Paper strips $4^b$ pass through right hand guide 13 and are wound up on the right hand winding form 17. Over each layer of paper on this form are wound the metal strips $5^a$ which pass through the right hand guide 12. When these various strips are supplied at the completion of the winding of the coils the free strips are held under tension and in place by means of the friction shoe 51 of which there is one on each guide. By means of the machine illustrated in the drawings for purposes of illustration four separate coils are made simultaneously but it is of course apparent that a larger number could just as easily be made by modifying the slitting rolls and employing wider paper and metal stock to provide more strips of material.

From the above description the construction and operation of the machine will be apparent to one skilled in the art and a further detailed description of its operation seems unnecessary.

It will be apparent from the above disclosure that I have provided a machine con-

structed and operated in accordance with certain principles which may be readily embodied in other physical forms without departing from the spirit and scope of this invention. I do not, therefore, desire to be strictly limited to the machine as illustrated and described but rather to the scope of the invention as it is defined in the appended claims.

What I seek to secure by United States Letters Patent is:

1. In a coil forming machine of the type described, the combination comprising means for slitting continuous strips of paper and metal into a plurality of narrow strips, and means for winding these strips into a plurality of coils comprising alternate layers of paper and metal.

2. In a machine for winding a plurality of coils simultaneously, the combination comprising a support for a roll of paper and a roll of metal stock, means for feeding and slitting the paper and metal stock into a plurality of strips, and means for winding said strips into a plurality of coils comprising alternate layers of paper and metal.

3. In a machine for winding a plurality of coils simultaneously, the combination comprising means for supporting paper and metal stock in the form of strips, means for simultaneously and continuously slitting the paper and metal strips into a plurality of narrower strips, means for winding each narrower paper and metal strip into a coil comprising alternate layers of paper and metal, and means for driving all of said means conjointly.

4. In a machine for winding a plurality of coils simultaneously, the combination comprising means for supporting paper and metal stock in the form of strips, means for simultaneously and continuously slitting the paper and metal strips into a plurality of narrower strips, means for winding each narrower paper and metal strip into a coil comprising alternate layers of paper and metal, means for guiding the complementary paper and metal strips, and means for driving all of said means conjointly.

5. A machine for winding electrical coils comprising means for slitting strips of insulating material and metal into a plurality of narrower strips, winding forms supported for rotation, frictional clutch means for driving the winding forms and means for guiding strips of paper and metal onto the winding forms in alternate layers to produce electrical coils of insulated turns.

In testimony whereof I have hereunto set my hand on this 21st day of May, A. D. 1930.

CHESTER H. THORDARSON.