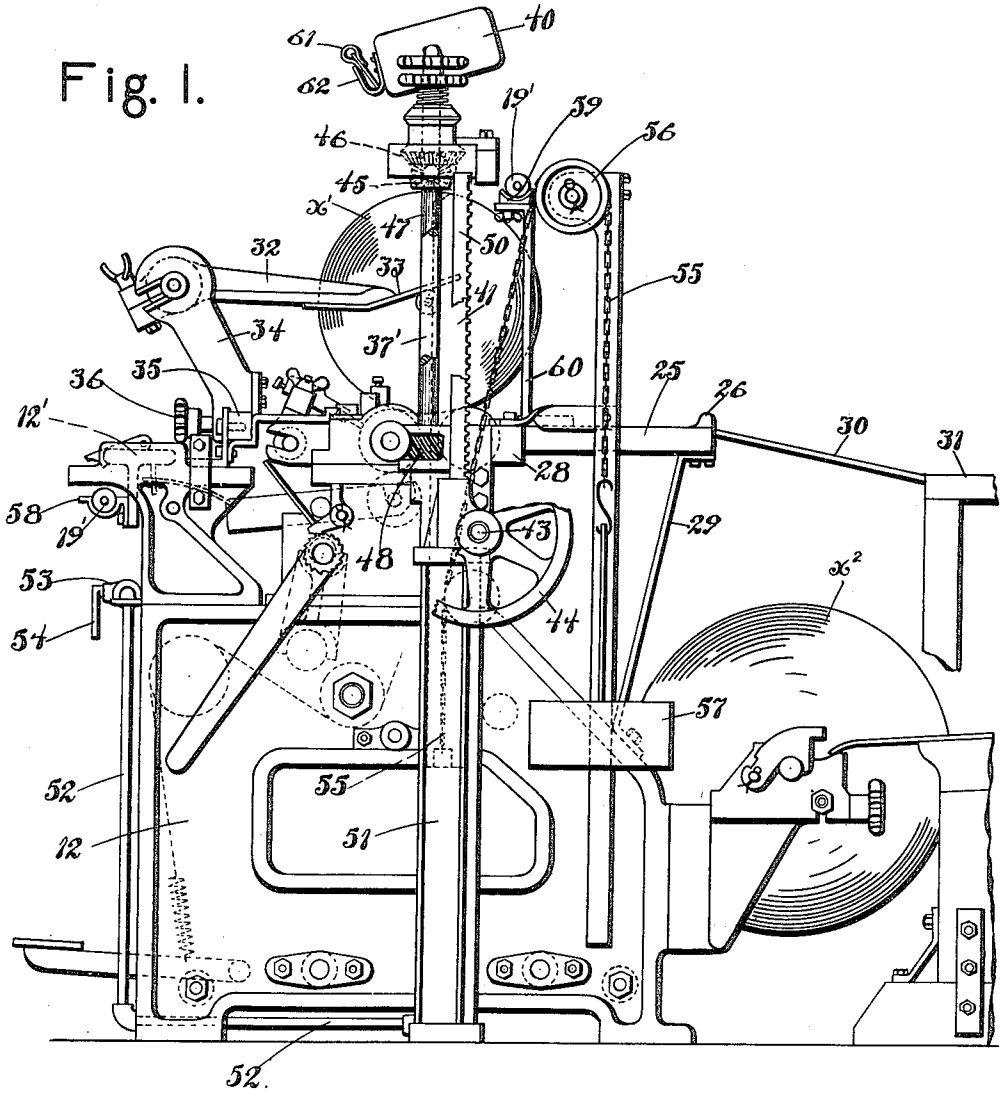
Feb. 26, 1924. 1,484,843

E. J. O'CLAIR

SLITTING AND REWINDING MACHINE

Filed May 7, 1923 3 Sheets-Sheet 1

Fig. 1.



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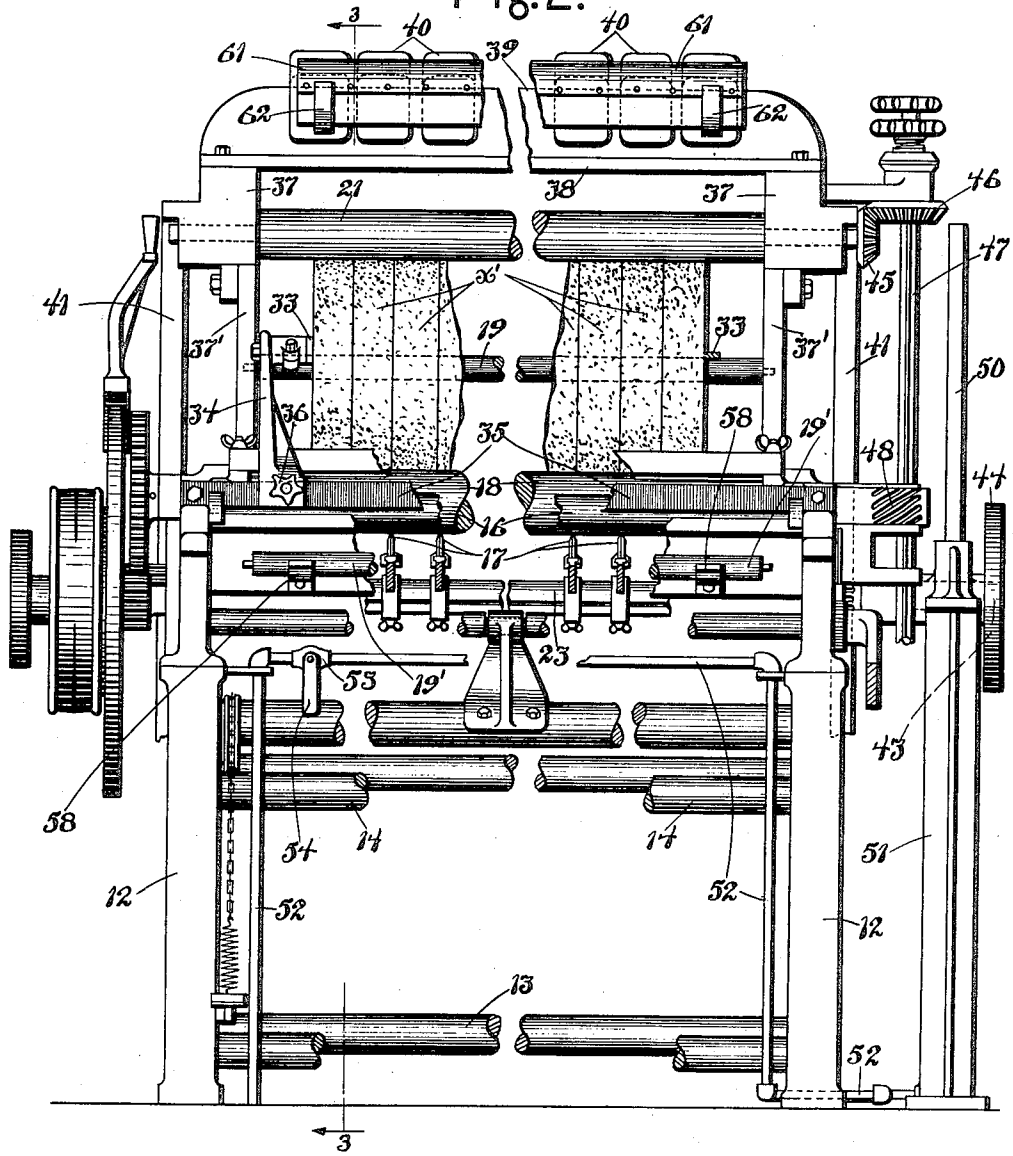
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Fig. 2.



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Fig. 4.

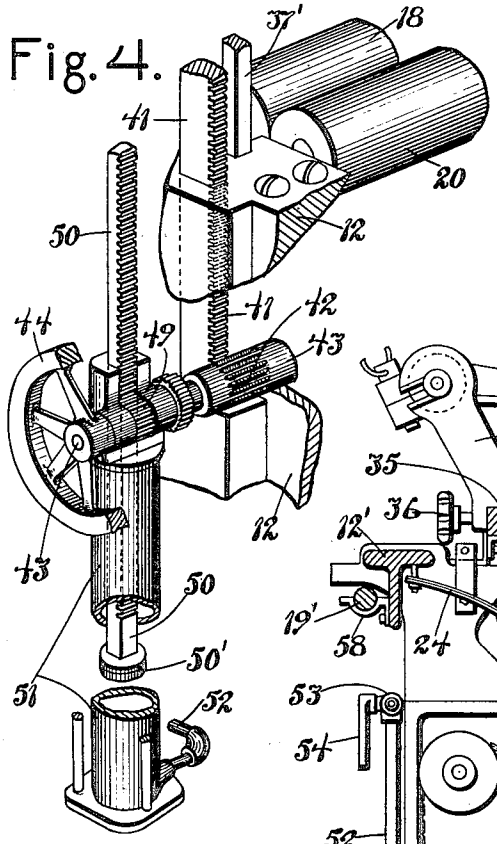


Fig. 5.

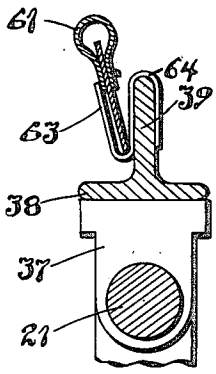
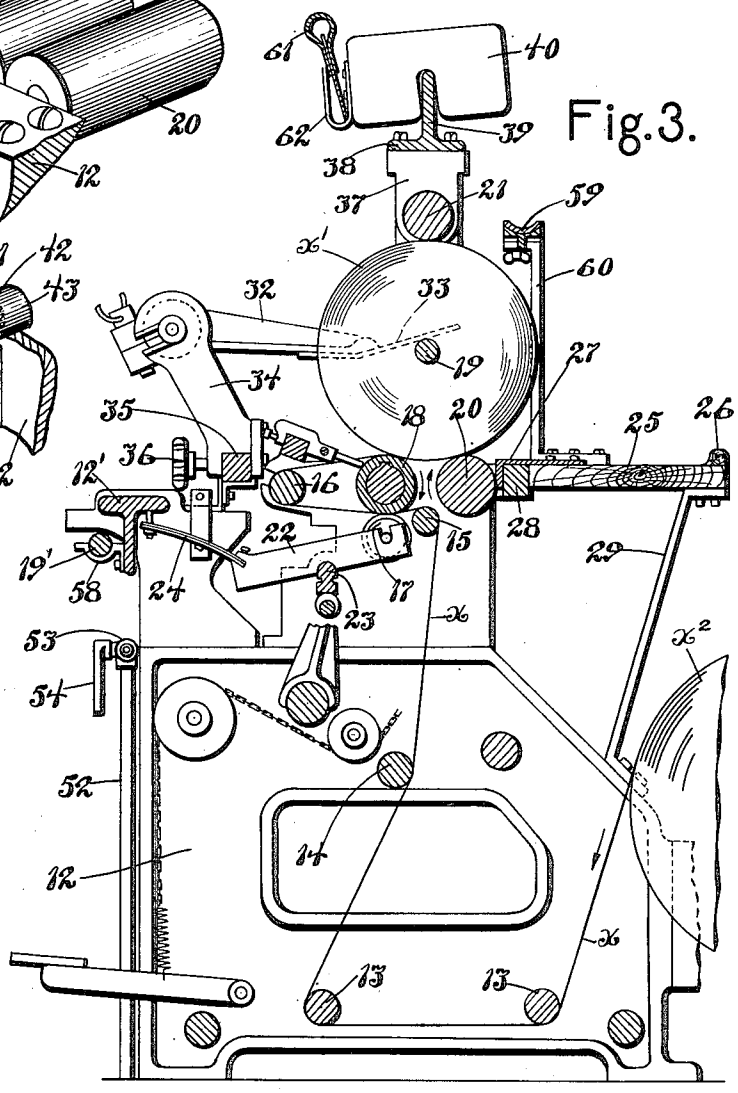


Fig. 3.



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UNITED STATES PATENT OFFICE.

EDWARD J. O'CLAIR, OF NASHUA, NEW HAMPSHIRE, ASSIGNOR TO NASHUA GUMMED & COATED PAPER COMPANY, OF NASHUA, NEW HAMPSHIRE, A CORPORATION OF MASSACHUSETTS.

SLITTING AND REWINDING MACHINE.

Application filed May 7, 1923. Serial No. 637,041.

To all whom it may concern:

Be it known that I, EDWARD J. O'CLAIR, a citizen of the United States, and resident of Nashua, in the county of Hillsboro and State of New Hampshire, have invented certain new and useful Improvements in Slitting and Rewinding Machines, of which the following is a specification.

This invention relates to machines for converting a comparatively wide web of sheet material such as paper or cloth into a plurality of narrow strips in the form of coils or small rolls. Such machines are commonly known as slitting and re-winding machines, and several different types thereof are well known.

No machines of this character are really continuous in operation. They may run continuously and at quite a high speed so long as the supply or web roll is not exhausted and during the slitting and rewinding of strips into coils of predetermined diameters, but frequent stoppages are necessarily effected. Most of the stoppages and consequent idleness of the machine are to enable the completed coils to be removed and permit the operator to connect the ends of the strips to a fresh arbor for the next coils. Further idleness is due to the necessary occasional replenishment of the supply. When a supply roll is exhausted the machine must be stopped during the removal of the core of the exhausted roll, the placing of a fresh supply roll in position, and the piecing together (as by suitable adhesive) of the ends of the two webs.

It will be readily understood that since the purpose of the machine is to produce coiled strips, the element of time during which the machine is stopped for the reasons explained must be considered in the cost of production. In other words the overhead expense of the plant and the time cost of the attendants must enter into the cost of producing the coils just as much when the machine is idle for effecting the changes referred to as when the machine is actually doing the slitting and re-winding.

The object of the present invention is to increase the effective speed of operation of machines of the type referred to, by means of mechanisms which materially reduce the time required for removing completed coils, and starting fresh coils.

Of the accompanying drawings which illustrate my improvements as applied to a known type of slitting and re-winding machines:

Figure 1 is a side elevation of the complete machine, partly broken out.

Figure 2 represents a front elevation, partly broken out, looking from the left of Figure 1.

Figure 3 represents a vertical section on line 3—3 of Figure 2.

Figure 4 is a detail perspective view of the gearing by means of which a motor is caused to effect a raising, or permitting the lowering, of the frame which carries the pressure roll.

Figure 5 represents a sectional detail hereinafter referred to.

Similar reference characters designate similar parts in all of the views.

The frame of the machine is indicated at 12. In the type of machine illustrated, the web of paper or other material x leads from a supply roll x^2, which, in the present machine, is supported at the rear of the machine, the paper then passing under a suitable guide roll or rolls 13, past a guide roll 14, around guide rolls 15, 16, is slitted after passing roll 15 by means of cutter disks 17 which are spring-pressed toward a hard metal roll 18 which not only cooperates with the disks 17 in effecting the slitting and is therefore sometimes referred to as the cutter roll, but also, as will presently appear, acts as a feed roll for the superimposed coils x' resulting from the strips being wound on an arbor shaft 19.

Parallel with the roll 18 is a roll 20, and the coils bear on the two rolls 18, 20, both of which are driven in the same direction by gearing well known and not necessary to illustrate or describe in detail, the two rolls acting as feed rolls to effect rotation of the coils bearing thereon. A pressure roll 21 which bears on the upper surfaces of the coils serves to maintain them in smooth contact with the feed rolls, said pressure roll being driven by mechanism and gearing which will be described hereinafter.

The cutter disks 17 are carried by levers 22 pivotally mounted on a bar 23 and acted upon by springs 24 to cause the disks to exert sufficient pressure on the material x against the roll 18 to effect the slitting. The

bar 23 is vertically adjustable by means of an eccentric shaft below it.

As so far described the mechanism illustrated, and the operations of the parts thereof, are substantially the same as disclosed in Letters Patent No. 1,076,189, issued October 21, 1913, to Cameron & Birch.

One of my improvements consists in the provision of means for facilitating the disposition of a completed set of coils x'. Such coils, especially when of large diameter, are difficult to handle or move when shifting them from position on the cutting and feed rolls 18, 20, to a place for disassembling. As shown by Figures 1 and 3, I provide a coil shelf 25 at the back of the machine above the support for the supply roll x^2, the upper surface of the shelf being substantially flush with the upper surfaces of the rolls 18, 20. A completed set of coils may be easily and quickly rolled onto said shelf between two uprights 60 hereinafter described, and is arrested by a ridge 26 at the rear edge of the shelf. As shown, the inner edge of the shelf is connected by suitable cleats or straps 27 to a transverse bar 28 of the machine, and its outer edge is supported by one or more struts 29. After a completed set of coils has been shifted onto the back shelf, and consequently out of the way of the immediate resumption of coiling to produce another set, said completed set can be taken care of by the attendant who effects the disassembling, as by sliding the set along a guideway or bridge 30 onto a disassembling table 31 a portion of which is indicated in Figure 1. It is to be assumed that the table 31 is at a little distance away to one side of the machine, and that the bridge 30 extends thereto in a somewhat diagonal direction so that the set of coils, after being swung a little, can be slid lengthwise of the bridge. Said bridge and table however are not parts of the machine and are not claimed herein. They are referred to merely to aid the explanation of the readiness with which a completed set of coils can be disposed of to permit resumption of coiling. Such resumption can start as soon as a completed set has been rolled onto the shelf 25.

In machines of this character it is customary to employ what are called "coil guards," which extend past and engage the outer sides of the end coils of the set. Such devices are illustrated herein as comprising arms 32 having coil-engaging strips 33, the arms being pivotally connected to brackets 34 removably mounted on a transverse bar 35 and each being so secured to the bar that it may be adjusted along the bar and secured by a hand screw 36. In machines of this type as heretofore constructed, the coil guards and their supporting bar are at the rear of the machine. In such location they would interfere with movement of a completed set of coils onto the shelf 25. My improvement in this respect consists in the coil guard arms mounted on the bar 35 which is at the front of the machine instead of at the back, so as not to interfere with the rolling of the coils x' onto the coil shelf 25 which, if to serve the purpose hereinbefore described, must be at the rear of the machine.

The roll 21 hereinbefore referred to exerts pressure on the coils during the re-winding or coiling, in order to effect uniform tension on all the coils by holding them in smooth uniform contact with the feed rolls 18, 20. Said pressure roll is mounted in bearings 37 (Figs. 2 and 3) connected by a cross bar 38 having an upstanding rib 39 to permit the removable mounting thereon of a series of weights 40. Extending down from the bearings 37 are bars 37′ which are suitably mounted in the frame of the machine, and parallel therewith are two rack bars 41. The cross bar 38, bearings 37, the guide bars 37′ and the rack bars 41 constitute, as a whole, a vertically movable frame carrying the pressure roll 21.

The rack bars 41 are engaged by pinions 42 carried by a shaft 43 having a hand wheel 44 by means of which the frame and its pressure roll 21 may be manually shifted up or down if occasion renders such operation desirable. To enable such movements to be effected quickly however, regardless of the size and weights of the completed coils, and especially when the frame and its weights are to be raised to elevate the pressure roll when a set of completed coils is to be removed for disassembling, I employ the pneumatic mechanism which will be presently described.

During the operation of the machine the pressure roll is positively driven in a manner similar to that described in the Patent 1,076,189 hereinbefore referred to. The mechanism for so driving the pressure roll includes a bevel gear 45 at one end of the pressure roll, said gear meshing with a gear 46 at the upper end of a vertical shaft 47 which slides in suitable bearings in the frame of the machine and is so connected with the vertically movable frame which carries the pressure roll as to move vertically therewith. The shaft 47 is driven by spiral gearing indicated at 48, said shaft having, as usual, a splined connection with said gearing.

The shaft 43, in addition to the two pinions 42, has at one end (Fig. 4) a pinion 49 which is in mesh with a rack bar 50 the lower end of which carries or is connected to a piston 50′ in a rigidly mounted vertical cylinder 51. A pipe 52 having a valve 53 provided with a handle 54 in a location within immediate reach of the attendant at the front of the machine, leads from a source of compressed air to the lower part of the cylinder. The valve is, preferably, of a well known type which, by turning it one way

compressed air is admitted to the cylinder to effect a speedy lifting of the vertically movable frame carrying the pressure roll, and by turning it the other way will permit air to escape and the consequent lowering of the said frame. This mechanism constitutes a pneumatic motor which, at the will of the operator, will effect a quick lifting of the heavy frame to raise the pressure roll high enough to enable a completed set of coils to be removed onto the receiving shelf 25. Then, upon turning the valve handle the other way, the air can be permitted to escape from the cylinder at a regulatable slow speed so that the frame and the pressure roll will not descend at too high a speed.

In other words, the pneumatic motor not only enables the frame and pressure roll to be raised quickly when coiling has been completed, but also cushions descent thereof so as to prevent damage to a freshly located arbor shaft.

It is sometimes desirable to partially counterbalance the vertically movable frame. As indicated in Figure 1 the counterbalancing mechanism comprises a chain 55 connected to the lower end of each rack bar 41 and passing over a pulley 56 and having a weight 57 suspended from its other end.

When a set of completed coils has been disassembled on, for instance, the table 31, the arbor thereof is free to be used for another coiling operation. In order that it may be in quickly accessible position for use as soon as one set of coils and their arbor have been pushed or rolled onto the shelf 25, I provide an arbor holder comprising a pair of recessed brackets 58 secured to and projecting slightly from a transverse front bar 12′ of the frame. The spare arbor indicated at 19′ is placed in the holder 58 (Fig. 3) where it is in quickly accessible position for the attendant when he is ready to begin a fresh coiling operation. The attendant who does this always stands at the front of the machine. The arbor holder 58 is more particularly for use when the machine is producing large coils. When the coils being produced are small ones, it is desirable that the spare arbor to which the ends of the strips are to be attached at the start of a coiling operation shall be in such position that the attendant can grasp it as he withdraws his hands from the set which he has pushed onto the shelf 25. For this purpose I provide an arbor holder 59 in an elevated position near the back of the machine, said holder being trough-shaped and high enough to enable a completed set of coils to be rolled under it. Said holder 59 is supported by a pair of uprights 60 at its ends. The uprights are preferably removable so that they and the holder 59 can be separated from the machine if desirable.

In order to connect the ends of a series of strips to an arbor, to begin a coiling operation, it is customary to employ what is known as a crimping bar such as indicated at 61. It is desirable, for the sake of economizing time, that the crimping bar shall also be in quickly accessible position for use as soon as an arbor shaft has been placed in position with its reduced ends entering the usual vertical grooves in the bars 37′. As indicated in Figures 1, 2 and 3, some of the weights 40 are provided with U-shaped brackets 62 which will hold the crimping bar during operation of the machine in a position where it can be quickly reached by the attendant at the front of the machine. Inasmuch however as the weights 40 are not always employed, not being required for some kinds of work, I provide other crimping bar holders 63 (see Fig. 5) which are also U-shaped but have hook extensions 64 which engage the rib 39 of the cross bar of the vertically movable frame when the weights are removed therefrom. In both of the forms shown in Figures 3 and 5, the crimping bar holder has a portion which engages the rib 39. In Figure 5 the hook extensions 64 are integral portions of the crimping bar holder, while in Figure 3 the combined weight 40 and its U-shaped bracket 62 comprise the means for removably mounting a crimping bar on said rib.

In the operation of the machine, the several improvements described coact in saving time in the production of slitted and rewound material, by reducing the length of the period of idleness between the completion of a set of coils and the resumption of another coiling operation. This is because as soon as a set of coils has reached the predetermined diameter, the attendant who stands at the front of the machine in position to sever the strips and secure the ends on the coils in the usual manner, operates the valve handle 54 to admit air to the cylinder 51. The pressure roll 21 quickly rises and the attendant pushes the set of coils onto the shelf where anyone can take care of it for disassembling. The attendant then takes an arbor 19′ which is within reach and fits it to position between the bars 37′, takes the crimping bar from its holder and connects the ends of the web strips to said arbor in the usual manner, and then operates the valve handle to permit the pressure roll-carrying frame to descend, and starts the fresh coiling. All of his actions can be performed while he remains at the front of the machine.

Therefore his movements, while performing said actions, are unrestricted because both the supply roll x^2 and the coil-receiving shelf 25 are at the same (the rear) side of the machine.

Having now described my invention, I claim:

1. In a slitting and re-winding machine having rolls for supporting and driving the coiled strips, a coil-receiving shelf behind said rolls, a support for a supply roll at the same rear side of the machine as said shelf, and coil guards supported in front of the rolls.

2. In a slitting and re-winding machine having rolls for supporting the coiled strips, a coil-receiving shelf behind said rolls, a support for a supply roll at the same rear side of the machine as said shelf, a transverse bar in front of the rolls, and coil-guard arms adjustably mounted on said bar and projecting rearwardly past the ends of the coils.

3. In a slitting and re-winding machine having a vertically movable frame provided with a pressure roll to bear on the coils, rack bars connected with said frame, a power-actuated rack at one side of the frame, and a shaft having pinions meshing with said rack bars and rack.

4. In a slitting and re-winding machine having a vertically movable frame provided with a pressure roll to bear on the coils, rack bars connected with the frame, a rack at one side of the frame, a cylinder having a piston from which the last mentioned rack extends, connections for supplying the cylinder with compressed air, and a shaft having pinions meshing with said rack bars and with the rack which extends from the cylinder.

5. In a slitting and re-winding machine having a vertically movable weighted frame provided with a pressure roll, a pneumatic motor for raising the frame and pressure roll and for cushioning downward movement thereof.

6. In a slitting and re-winding machine having rotary supporting and driving means for the coiled strips, a spare arbor holder at the front of the machine and a spare arbor holder at the rear in an elevated position.

In testimony whereof I have affixed my signature.

EDWARD J. O'CLAIR.

Witnesses:
MYRON BUSWELL,
V. E. NUNEG.