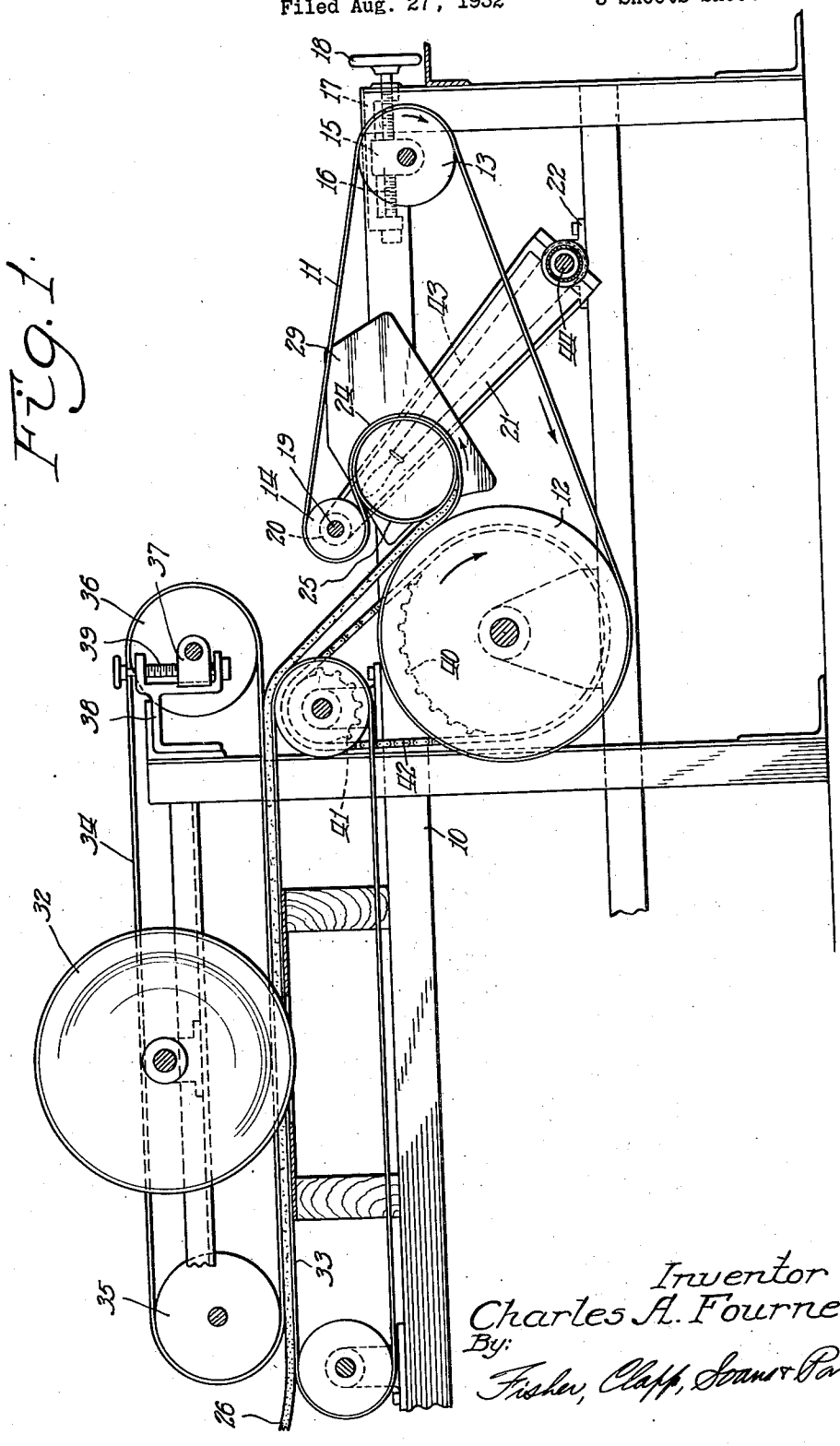
May 22, 1934. C. A. FOURNESS 1,959,418

WINDER FOR SHEET MATERIAL

Filed Aug. 27, 1932 3 Sheets-Sheet 1

Fig. 1.



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Filed Aug. 27, 1932 3 Sheets-Sheet 2

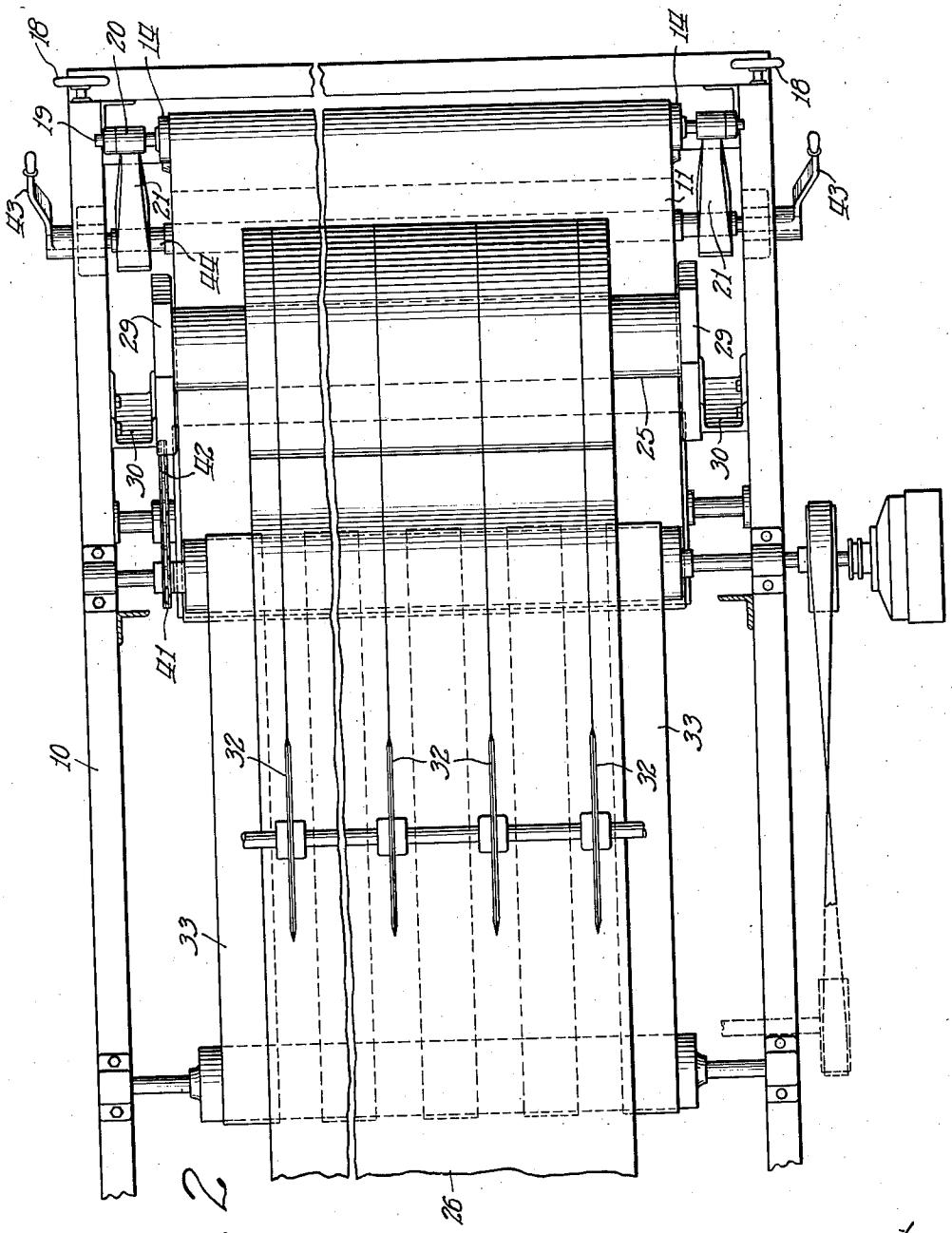

Fig. 2

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Filed Aug. 27, 1932 3 Sheets-Sheet 3

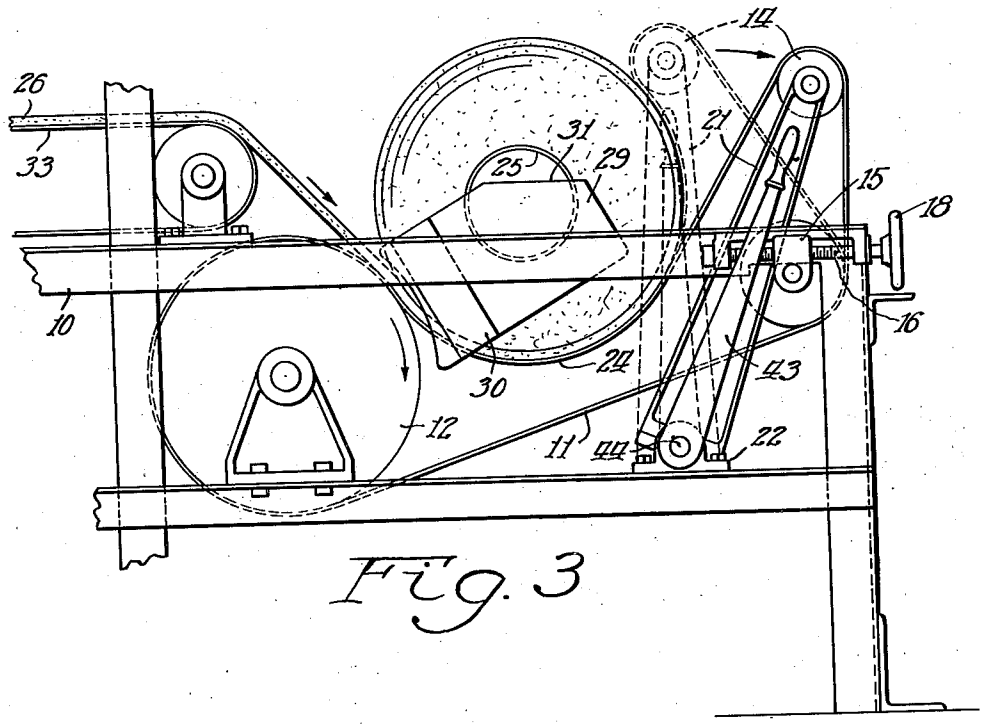

Fig. 3

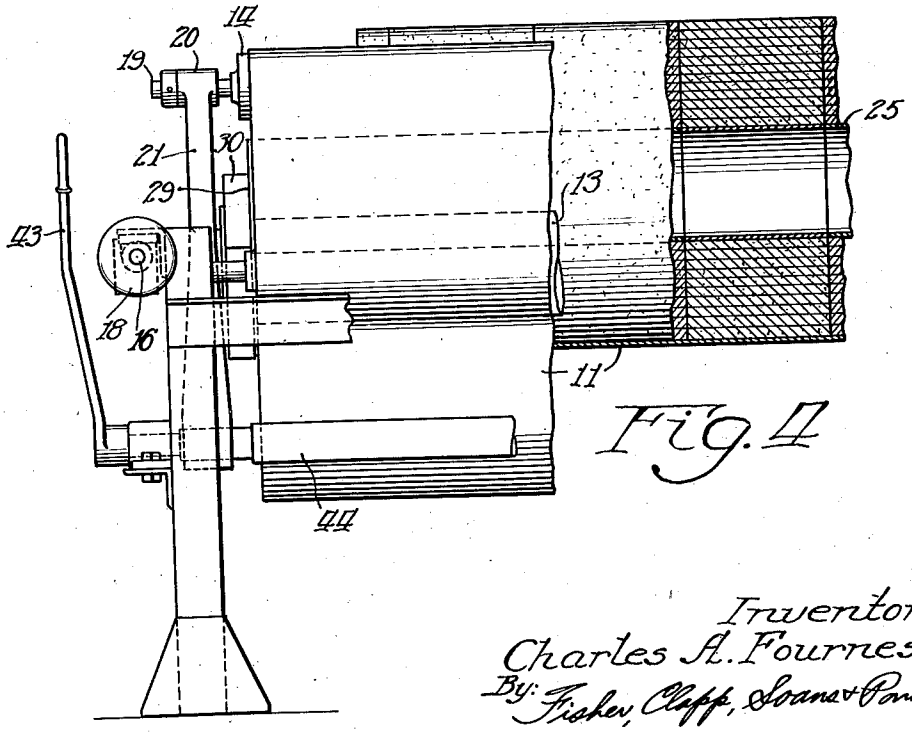

Fig. 4

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UNITED STATES PATENT OFFICE

1,959,418

WINDER FOR SHEET MATERIAL

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Application August 27, 1932, Serial No. 630,636

6 Claims. (Cl. 164—65)

The main objects of this invention are to provide a simple but efficient machine for winding sheet material in rolls; to provide mechanism for the purpose indicated which will be especially adapted for winding softpadding-like material in the rolls, although not restricted to such use; to eliminate in the apparatus of the character described, the use of a mandrel or core shaft and the necessary handling thereof, both at the starting and finishing of the roll-forming operation; and in general, it is the object of the invention to provide an improved winding mechanism of the character referred to.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawings (3 sheets) in which the paper winder embodying a preferred form of the invention is illustrated.

In the drawings:—

Fig. 1 is a side elevation.

Fig. 2 is a plan.

Fig. 3 is a fragmentary side elevation showing certain parts in a changed position.

Fig. 4 is a fragmentary end view, certain parts being broken away and shown in section to more clearly illustrate the structure.

Referring now to the drawings, the improved winder includes frame-work indicated generally at 10, this frame-work being formed of angle iron or any other suitable construction.

The winding or roll forming elements proper of the apparatus include an endless belt 11 which is guided around rollers 12, 13, and 14. As clearly shown in Fig. 1, the roller 12 is a large diameter roller which is fixedly mounted for rotation on the frame 10. The roller 13 is mounted for rotation on a shaft carried by brackets such as 15 which are adjustably carried by a screw threaded shaft 16 rotatably mounted in a bracket 17 which is suitably secured to the frame-work 10. The shaft 16 is provided with a hand wheel 18 whereby it may be rotated to effect longitudinal adjustment of the brackets and of the bearing element 15 as will be clearly understood from an inspection of Figs. 1 and 3.

The roller 14 is mounted on a shaft 19 which is rotatably supported in the free ends 20 of a pair of arms 21. The opposite ends of the arms 21 are pivotally mounted in suitable brackets such as indicated at 22 which are carried by the frame-work 10.

The swingably mounted roll 14 engages the upper reach of the belt 11 between the main rollers 12 and 13, and it is adapted to form a portion of said upper reach of the belt into a loop 24. Formation of the loop 24 is further facilitated by the provision of hollow cores such as 25 which engage the outside of the belt between the roller 14 and the roller 12. The cores are disposed in co-axial alignment transversely of the belt and they are not mounted, but are supported solely by the loop portion of the belt 11 and hence may be called free or floating cores. By reference to Fig. 1, it will be understood that the upper reach of the belt is so much longer than the lower reach that the roller 14 and hollow core members 25 may cooperate to form the belt loop 24 as indicated.

A web of sheet material 26 which it is desired to wind into the form of a roll is fed to the loop 24 of the belt 11, between the looped portion 24 of the belt and the hollow core 25, substantially as shown in Fig. 1. There being a predetermined amount of tension on the belt 11, it will be evident that the leading end of the web 26 will be pinched between the belt loop 24 and core 25 and caused to continue around the core 25, whereby the operation of the rolling of the web on the core is started. Continued rotation of the core 25, of course, results in gradually building up a large roll of the webbing and as the diameter of the roll increases, the roller 14 swings in a clockwise direction to allow the belt loop 24 to expand as required.

When the roll is small, the arms 21, roller 14, and hand levers 43, are inclined in the general direction indicated in Fig. 1, and the weight of said parts serves to maintain the loop portion 24 of the belt 11 in driving engagement with the roll. When the roll becomes larger, an increased length of the belt is engaged because of the increased diameter and circumference of the roll so that it is not necessary to maintain pressure contact between the belt and roll other than such as is incident to the weight of the roll. Hence, when the arms 21 become inclined in the direction indicated in Fig. 3, ample driving effect of the belt on the roll is still obtained.

For preventing endwise shifting of the core 24 and consequent irregularity of the roll formed on the core, the core guide plates such as 29—29 are secured through the agency of brackets such as 30 to the frame-work 10, these guide places being so positioned and preferably elongated so that they will constantly engage the ends of the hollow core 25, regardless of the lateral shifting of the core as an incident to the gradually increasing size of the roll. By

comparison of Figs. 1 and 3, it will be seen that when the winding operation is first begun, the core 25 is located opposite the lower, inner ends of the guide members 29 and that when the roll has reached a considerable diameter, the core has shifted horizontally outwardly so as to be opposite the outer upper end portions of the guide plates. The upper corner portions of the guides are preferably cut off as indicated at 31 so that the attendant of the machine may insert his hands or some suitable lifting device into the core of the roll, thereby facilitating the operation of removing the completed roll from the winding mechanism.

In some instances, it is desired to form a plurality of relatively narrow rolls from a wide strip of webbing. In such cases, the strip of webbing 26 may conveniently be slitted through the agency of the necessary number of cutting discs or slitters 32 spaced apart to divide the web into the desired number of strips. The slitting knives 32 may be supported and located by any suitable means, not shown.

For effectively feeding the strip 26, whether it is slitted or not, a suitably driven belt conveyor 33 is provided which carries the strip towards the winding apparatus. A cooperating belt conveyor 34 serves to effectively hold the webbing strip 26 in engagement with the conveyor 33 to prevent slippage between the conveyor 33 and webbing sheet. Of course, in the event that slitters such as 32 are used, conveyors 33 and 34 will be in the form of a series of relatively narrow conveyor bands substantially as indicated in Fig. 2, which fit between the adjacent knives 32. Also, in the event that the web is slit into narrow strips to form narrow rolls, the core 25 will, of course, consist in a series of axially aligned, relatively short cores which are positioned between the guides 29. It will be understood that such a series of cores is effectively maintained in proper alignment by reason of the loop 24 of the winding belt which embraces approximately the entire length of the combined cores.

In the embodiment illustrated, the upper conveyor bands 34 extend around pulleys 35 and 36 of which the pulley 35 is fixedly mounted for rotation while the pulley 36 is mounted for rotation in a bearing member 37 which is adjustably carried by a bracket 38 and screw 39. By turning the screw 39, the bearing member 37 may be adjusted towards or from the lower conveyor members 33, whereby the degree of pressure between the belts 33 and 34 may be adjusted to suit conditions.

The mechanism may be driven from any suitable source of power applied to either the web feeding mechanism or the winding mechanism; for example, to the pulley 13 or shaft which carries said pulley. Power is transmitted from one mechanism to the other by means of sprockets such as 40 and 41 respectively associated with the winding conveyor pulley 12 and feed conveyor 33, and a chain 42 which extends around and engages both of said sprockets.

To facilitate manual adjustment of the arms 21 and roller 14 by means of which the winder belt loop 24 is formed, hand levers such as indicated at 43 may be secured to each end of a shaft 44 which may extend across the machine and connect both of the arms 21 for unitary swinging movement.

When the desired length of webbing has been wound into a roll, the mechanism is stopped and the completed rolls removed and empty cores placed on the belt between the guides 29. To facilitate removal of the completed rolls, the arms 21 are swung to an extreme outward position as indicated in full lines in Fig. 3, in which the winding loop 24 is opened up so as to release the rolls. Thereafter, the arms 21 and roller 14 are restored to the initial, winding loop forming position illustrated in Fig. 1.

The described arrangement of mechanism is obviously quite simple but it is nevertheless effective and efficient and eliminates the requirement of core shafts or the like and the handling thereof which would necessarily be incident to their use. The core members 25 used in this mechanism may, of course, be of paper or fibre or any other suitable material, great strength not being required.

Changes may be made in the described construction without departing from the spirit of the invention, the scope of which should be determined by reference to the following claims, the same being construed as broadly as possible, consistent with the state of the art.

I claim as my invention:—

1. In a winder of the class described, the combination of an endless belt, means for driving said belt, means for forming a loop in one reach of the belt, a floating core positioned in said loop, and means for feeding a strip of sheet material between the looped portion of said belt and said core for winding such strip into a roll on said core.

2. A winder of the class described comprising an endless belt, means for driving the belt, means for feeding and guiding a web of material into roll formation comprising a floating core, and means for causing the belt to drivingly embrace more than 180 degrees of the circumference of the core during the beginning of the winding operation.

3. In a winder for winding a plurality of strips of sheet material into relatively independent rolls, the combination of an endless belt, means for driving said belt, means for forming an expansible loop in one reach of said belt, a plurality of co-axially aligned floating cores disposed on said belt and adapted to be embraced by said loop and thereby rotated, and guide means at the outer ends of the outermost of said aligned cores for maintaining the same in predetermined position transversely of the belt.

4. In a winder of the class described, the combination of a pair of relatively spaced pulleys, a driven endless belt extending around said spaced pulleys, a swingably mounted roll for engaging said belt intermediate said first mentioned rolls, a floating core element engaging the said belt intermediate said last mentioned roll and one of said first mentioned rolls, and means for guiding said core to maintain the same in predetermined position transversely of the belt, said swingably mounted roll being adjustable to one position for causing the belt to loop around a material portion of the circumference of the core for effecting rotation thereof and to another position for straightening out said loop to facilitate removal of the core.

5. In a winder of the class described the combination of a belt conveyor for advancing a web of sheet material, means for longitudinally slitting said web to thereby divide said web into a plurality of strips, another belt conveyor,

means for driving said other conveyor at substantially the same speed as said first-mentioned conveyor, means for forming a loop in one reach of said other conveyor for receiving and winding said strips into relatively independent rolls.

6. In a winder of the class described, the combination of a belt conveyor for advancing a web of sheet material, means for slitting said web into a plurality of strips of material as an incident to the travel thereof, a winding belt of approximately the same width as the width of said sheet of webbing, means for driving said winding belt at substantially the same speed as said conveyor, a plurality of co-axially aligned means for forming a loop in one reach of said winding belt around co-extensive portions of said aligned cores.

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