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UNLOADING DEVICE FOR SLITTER AND REWINDING MACHINES.

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My invention relates to that class of machines known as slitters and rewinders, wherein a wide roll of paper or cardboard is slit into narrower width, but more particularly to the rewinding elements whereby the rewound paper or cardboard may be quickly and easily unloaded from the winding bars or mandrels.

Heretofore, in machines of this class, it has been customary to frictionally rotate rewinding bars to which the paper or cardboard strips are clamped, the bars being wholly removable from the slitting machine with the narrow paper or cardboard rolls attached, thereafter requiring transfer of the heavy metal bars and the paper or cardboard rolls attached to a convenient place where clamping means are released and the rolls removed. The bars are then replaced in the slitting machine for further rewinding operations.

The object of my invention is to eliminate all removable winding bars and to substitute in lieu thereof winding bars forming an attached part of the slitting machine and hinged or adjustably attached in such manner that their support and weight is carried by the machine at all times and from which bars the narrow paper or light cardboard rewound rolls may be readily stripped, the bars thereafter moved into driving connection with the friction drive means and the fresh paper or cardboard strips from the slitting cutters clamped to the bars for another rewinding operation.

By my improvements, no winding bars are required to be handled with the paper or light cardboard rolls and the latter are immediately dislodged as separate units and handled alone in baskets or otherwise as found convenient. In this manner, labor and time are saved and the cost of slitting and rewinding is materially reduced.

With these and other objects in view, my invention consists of improvements applicable to a slitting and rewinding machine and combined therewith all as hereinafter fully disclosed and more particularly pointed out in the claims.

Referring to the drawings: Fig. 1 is a side elevation of a slitting and rewinding machine embodying my improvements; Fig. 2 is a rear elevation of the rewinding and unloading means embodying my invention; Fig. 3 is a plan view of one of the rewinding

mandrels in operative position for being driven; Fig. 4 is a horizontal sectional view of the same; Fig. 5 is an enlarged view of a portion of Fig. 4; and Fig. 6 is a cross section of the mandrel showing how the paper strips are attached for rewinding.

2 is the main frame of the slitting machine and is provided with slitting means which may comprise two shafts with slitting cutting disks spaced along them and cooperating in pairs or one set of such cutter disks rolling in contact with the surface of a drum, as commonly employed, such slitting means being shown at 3 and 4 and driven by a band wheel 43 and belt 44. They may be driven in any other manner desired. 5 is a stand supported upon the floor for carrying the winding bar or mandrel upon which the wide paper roll 6 to be slitted is wound and by which it is supported, the web being guided over and under drag or tension bars 7 and 9 and passing between guide rods 10 to the slitting cutter means 3 and 4. The bar 9 is axially adjustable and provided with frames 8 in which the bar 7 is secured, so that an adjustment of the same may be made about the axis of the bar 9 to increase or decrease the drag or tension on the web for insuring it being under tension while passing through the cutters. The slitted paper provides a plurality of narrow strips 6^a and 6^b which are respectively guided over rods 11 and 12 and wound upon the separate mandrels 13 and 14, so that a series of narrow rolls spaced apart are formed upon each mandrel (Fig. 2). These mandrels are frictionally driven by a sprocket chain 42 which receives its motion from a sprocket wheel 42^a and drives the sprocket wheels 38. The foregoing description of the machine parts relate to constructions already known in slitting machines and I refer to them for the purpose of elucidating my improved winding and unloading means now to be specifically described.

As the upper winding mandrel 13 and its operative parts are identical with the lower mandrel 14 and its operative parts, it will suffice to describe the details of one of them and the description may be taken as applying to each of them. At one side of the machine is a fixed frame 15^a having upper and lower bearings 17^a and 18^a respectively for the driving shafts 31, while

at the other side is provided a hinged frame 15 movable about a vertical hinge joint 16 and having upper and lower bearings 17 and 18 respectively for the upper and lower mandrels 13 and 14. Referring more particularly to Fig. 4, the mandrel 14 is cylindrical and provided longitudinally with a slot whose bottom is inclined, being deepest at its free end and shallowest adjacent to its supported end. This mandrel is loosely journaled in the bearing 18 and capable of not only being rotated but also shifted longitudinally, this latter being secured by a pinion 20 on a vertical shaft 21, the teeth thereof engaging annular grooves 19 about the journal portion of the mandrel. As these grooves are each in separate parallel planes at right angles to the axis of the mandrel, the latter may rotate freely without changing its position of longitudinal adjustment provided for by the pinion 20. When the mandrel is moved to the right in its bearing 18, its free end is moved out of engagement with the driving head 32 on the driving stub shaft 31 journaled in fixed bearings 18^a. This stub shaft 31 is provided with a flanged hub 37 and a sliding sleeve 39 keyed to rotate with the shaft and carrying the freely rotatable sprocket wheel 38. Between the sprocket wheel and the flanged hub is an annular friction disk 40 which is clamped between said parts under the application of spring pressure from a spring 41 pressing upon the sleeve and adjustable by a nut 41^a. This provides a friction drive for the mandrel to compensate for the varying diameters of the paper rolls as they are being wound, the drive giving a sufficient speed for the smallest diameter of the rolls and permitting slipping to compensate for all greater diameters of the roll, the friction always being sufficient to insure tight winding against the resistance of the drag effect of the bars 7 and 9, etc. When the mandrel is shifted into engagement with the driving head 32, a space 24 is provided between the collar 23 thereof and the bearing 18 and into this is dropped a pivoted dog 25 (Figs. 2 and 3) to lock the mandrel from disengagement from the driving means. The dog 25 is loosely pivoted on a lateral pin 26 and retains its locking position by gravity. For disengaging the mandrel, the dog is lifted and turned back and the pinion 20 is rotated until the collar 23 of the mandrel is stopped by contact with the bearing 18.

Detachably fitting the slot or groove 27 in the mandrel 14 is a long clamping bar 28 which is sufficiently loose to enable it to clamp the ends of the paper strips down into the groove or slot 27, as shown in Fig. 6. This clamping bar is tapered to correspond to the taper of the slot and for the purpose of permitting easy withdrawal

when unloading the mandrels of the wound rolls. The end of the clamping bar 28 is beveled at 30 to provide an undercut hold on the end of the slot (Fig. 4) at its shallow end and the other or larger end of the bar is formed with an enlarged head having a hole 29 and a recess or notch for engaging a spring actuated catch 33 in the end of the driving head 32 and forced into engaging position by a spring 34 held in position by a plug 35 (Fig. 5). In securing the paper strip ends to the mandrel, they are laid across it over the slot 27, the bar 28 is then placed upon them forcing them into the slot, the nose of the bar engages the undercut end of the slot as at 30 and the head end is forced in and engages the spring catch 33 and thus retained. Furthermore, the head end of the clamping bar 28 is received in a radial slot 32^a in the head 32 and forms locking engagement therewith by which the mandrel is positively rotated.

Assuming that the narrow paper strips are alternately laid over the upper mandrel 13 and lower mandrel 14 and the said mandrels in winding engagement with socket heads 32 of the winding shafts 31, the clamping bars 28 are then inserted into the slots 27, clamping the ends of the paper strips therein and the head ends of the bars are pressed into the slots 32^a until they are locked in position by the spring actuated catches 33. The machine is then put into slitting and winding operation and continued in operation until the roll of paper 6 has been slit and rewound into a plurality of narrow rolls 6^a and 6^b on the respective mandrels, as indicated by dotted lines in Fig. 2. When this is done, the ends of the narrow strips of the respective rolls are each pasted down to avoid unwinding during transportation or further handling preliminary to use in making other articles.

To unload the mandrels of the numerous rolls of paper (or cardboard) thus formed, the following procedure is had: The locking dogs 25 are lifted and thrown back and the shaft 21 through a wrench applied to its head 22 is rotated a partial revolution to correspondingly rotate the gears 20 and thereby move the mandrels 13 and 14 to the right (Fig. 2) to disengage them and their clamping bars 28 from the socket heads 32. The frame 15 with the loaded mandrels is then swung around to the rear (as indicated in dotted lines in Fig. 3) and after hooks are applied to the holes 29 in the clamping bars 28 they are pulled out, thereby releasing all of the rolls and whereby they are free to be withdrawn from the mandrels in a speedy manner, the mandrels or winding means remaining as a part of the organized machine. The mandrels and their supporting frame 15 may then be swung again into winding position and the former moved into engage-

ment with the winding socket head 32, the paper ends clamped to the mandrels and slitting and winding proceeded with as before.

5 It will be seen that the important feature of the invention resides in having the mandrels hinged or otherwise carried by the machine so that they remain as part of the machine, yet permit the wound rolls to be removed longitudinally from their ends.

10 It will now be apparent that I have devised a novel and useful construction which embodies the features of advantage enumerated as desirable, and while I have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results; it is to be understood that I do not restrict myself to the details, as the same are susceptible of modification in various particulars without departing from the spirit or scope of the invention.

15 Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

25 1. A winding and unloading means for a slitting machine, comprising a main frame, a rotatable winding mandrel, a hinged frame in which the mandrel is journaled and by which it is hingedly connected to the main frame, said hinge having an upright axis positioned to the rear of the axis of the mandrel and its bearing whereby one end of the mandrel may be freed and swung from winding position to an unloading position while the mandrel is supported by the hinged frame, and operating means co-operating with the free end of the mandrel for rotating it when swung into winding position.

40 2. The invention according to claim 1, wherein further, the hinged frame carrying the mandrel is hinged to the main frame on a long vertical axis located at a considerable distance from the axis of the mandrel and in which hinged frame the mandrel is wholly supported when swung into unloading position.

50 3. A winding and unloading means for a slitting machine, comprising a main frame, a rotatable winding mandrel, a frame in which the mandrel is journaled hinged to the main frame whereby one end of the mandrel may be swung from winding position to unloading position so that the rolls of wound material may be withdrawn from one end of the mandrel while the other end is supported by the hinged frame, and operating means for rotating the mandrel when swung into winding position, and wherein further, the hinged connection of the mandrel with the main frame of the machine comprises a frame hinged to the main frame on a substantially upright axis and in which the mandrel is journaled for

rotation and with capacity for longitudinal adjustment for insuring driving engagement with the operating means for rotating the mandrel, and wherein also means are provided for moving the mandrel longitudinally in its journal bearing.

4. The invention according to claim 3, and wherein also the means for producing the longitudinal adjustment consists of a gear carried on the hinged frame and engaging a plurality of parallel annular ribs and grooves on the mandrel, said parts so constructed that the mandrel may rotate freely while in adjusting engagement with the gear.

5. A winding and unloading means for a slitting machine, comprising a main frame, a rotatable winding mandrel, a frame in which the mandrel is journaled hinged to the main frame whereby one end of the mandrel may be swung from winding position to unloading position so that the rolls of wound material may be withdrawn from one end of the mandrel while the other end is supported by the hinged frame, and operating means for rotating the mandrel when swung into winding position, and wherein further, the hinged frame on which the mandrel is journaled is hinged to the main frame on a substantially upright axis and in which frame the mandrel is journaled for rotation with capacity for longitudinal adjustment thereon for insuring driving engagement with the operating means for rotating the mandrel, means for moving the mandrel longitudinally, and means are provided for locking the mandrel against longitudinal movement when in engagement with the operating means.

6. The invention according to claim 5, wherein also means are provided for simultaneously clamping the material to the mandrel when locking the mandrel in driving engagement with the operating means, said means including a tapered slot on the mandrel and a tapered bar fitting into the slot and locking means to retain the bar in position during the rotation of the mandrel.

7. The invention according to claim 5, and wherein also, the operating means is provided with a rotatable socket head in which the end of the mandrel is received, and a clamping bar is detachably arranged in a slot along the mandrel for clamping the material to be wound to the mandrel, said bar also engaging a slot in the socket head and by which a driving connection is made.

8. A winding and unloading means for a slitting machine, comprising a main frame, a rotatable winding mandrel, a frame in which the mandrel is journaled hinged to the main frame whereby one end of the mandrel may be swung from winding position to unloading position so that the rolls of wound material may be withdrawn from

one end of the mandrel while the other end is supported by the hinged frame, and operating means for rotating the mandrel when swung into winding position, and wherein
5 further, the operating means is arranged adjacent to the free end of the mandrel when in winding position and having means for centralizing the free end of the mandrel for rotation and for frictionally driving the said
10 mandrel.

9. The invention according to claim 8, wherein further, means are provided for causing the mandrel to be adjusted longitudinally of its axis on the hinging means by
15 which it is hinged to the main frame, whereby the mandrel is moved into and out of locking engagement with the operating means when in winding position.

10. A winding and unloading means for a
20 slitting machine consisting of a frame hinged to the machine on a vertical axis, a mandrel having one end journaled in said hinged frame and with provision for longitudinal adjustment thereon, a rotating driving shaft
25 in alinement with the mandrel when adjusted to winding position and engaging the other end of the mandrel, means for providing a relative longitudinal adjustment of the mandrel with respect to the driving shaft, and
30 engaging means for locking the driving shaft and mandrel in driving relation during winding.

11. The invention according to claim 10,

wherein further, the mandrel is slotted longitudinally with a tapered depth of slot and a
35 removable tapered clamping bar is fitted to the tapered slot for clamping the materials to be wound.

12. The invention according to claim 10, wherein further, the mandrel is slotted longitudinally with a tapered depth of slot and
40 a movable tapered clamping bar is fitted to the slot for clamping the materials to be wound and also extended into engagement with the driving shaft whereby a rotary
45 driving connection is made between the shaft and end of the mandrel most distant from its hinged end.

13. In a winding and unloading means for a
50 slitting machine, the combination of two winding mandrels, a hinged frame in which the two mandrels are journaled and their weight supported, two frictionally driven
55 shafts for respectively rotating the mandrels at the same speeds, means for shifting the mandrels longitudinally into and out of operative engagement with the frictionally
60 driven shafts, and means common to both mandrels for simultaneously operating the means for shifting the mandrels, whereby they are simultaneously moved into and out of operative engagement with the frictionally driven shafts.

In testimony of which invention, I hereunto set my hand.

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