May 22, 1928. 1,670,886

W. C. FELLOWS

COLLAPSIBLE REWINDER

Filed Feb. 18, 1926 2 Sheets-Sheet 1

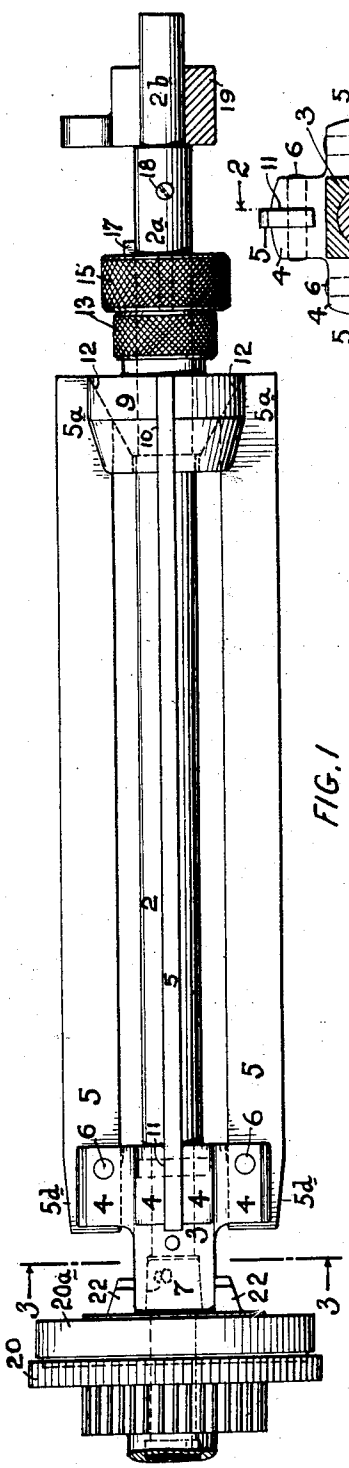


FIG. 1

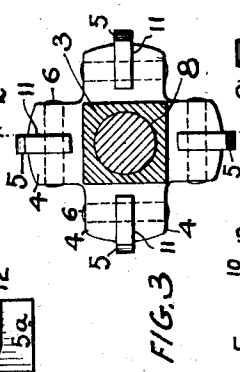


FIG. 3

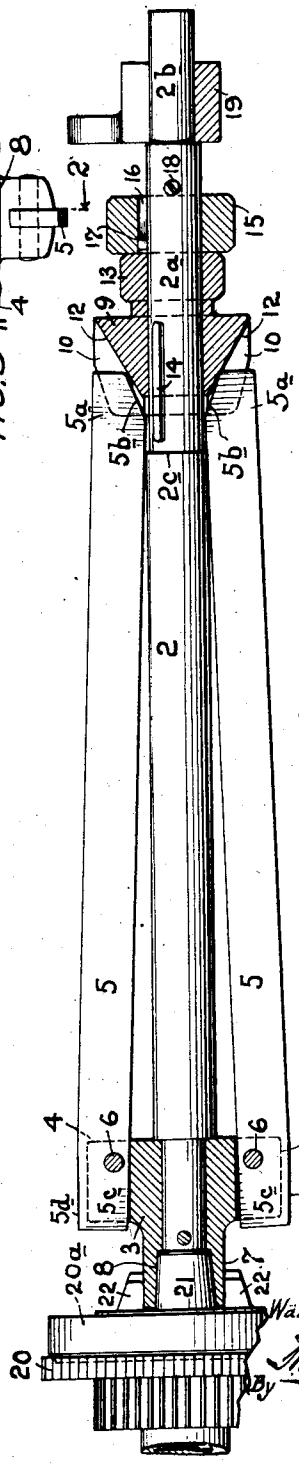


FIG. 2

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FIG. 4

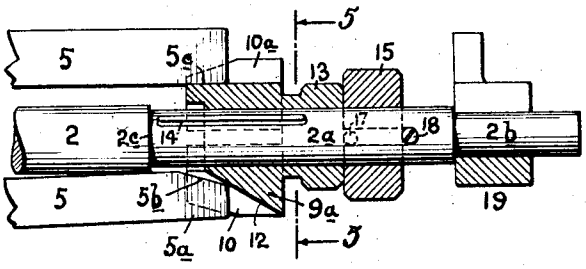


FIG. 5

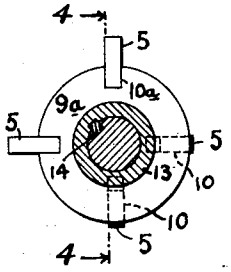


FIG. 6

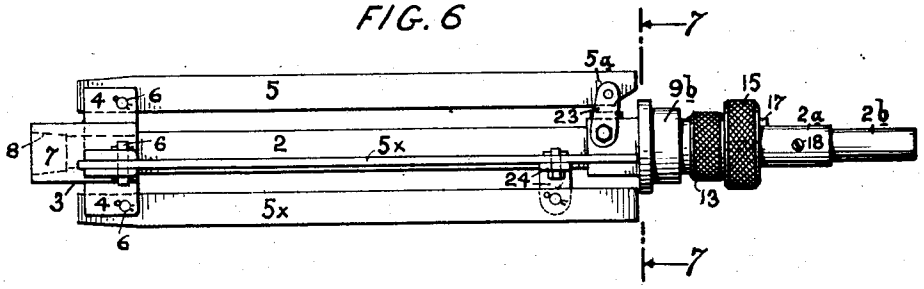
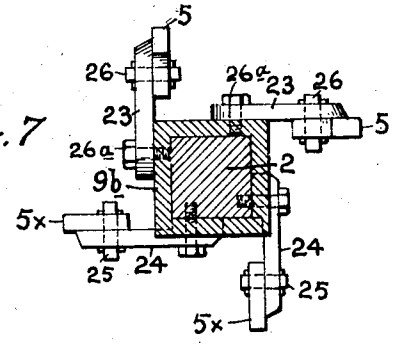


FIG. 7



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UNITED STATES PATENT OFFICE.

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COLLAPSIBLE REWINDER.

Application filed February 18, 1926. Serial No. 88,997.

In machines, such as intaglio printing presses, a web is required to be rewound after it has performed its function such, for example, as wiping the surface of the intaglio printing die or plate, and wherein the rewinder is adapted for quick and effective release of the paper cloth or other web after the same has been wound in roll form about the winder and preliminary to the replacement by another web.

More specifically, my improvements comprise a shaft adapted to be positively rotated and provided with a plurality of longitudinal bars spaced about the shaft and two or more of which are hinged adjacent to one end thereof and are normally held in parallel relation with the axis of the shaft by a sliding sleeve having cam surfaces, said sleeve arranged adjacent to the other end of the shaft and providing an outward thrust upon the hinged bars for holding them in distended parallel relation with the shaft and for allowing them to collapse when it is desired to remove the wound web roll, and wherein further, the shaft is provided with locking means for engaging the sliding sleeve and retaining it in a locked position when the bars have been spread to their maximum capacity, the said locking means preferably formed of a sliding collar which, in one position, may be moved away from the sleeve when collapsing the rewinder, and in another position moved toward the sleeve when expanding the rewinder, and being locked in such position by a slight rotation upon the shaft.

My invention also comprises features of construction which, together with those above enumerated, are more fully described hereinafter and specifically pointed out in the claims.

My invention will be better understood by reference to the drawings, in which: Fig. 1 is a side elevation of my improved rewinder in operative position with supporting and actuating parts of a machine; Fig. 2 is a longitudinal and vertical section of the same, taken on line 2—2 of Fig. 3; Fig. 3 is a transverse sectional view of the same, taken on line 3—3 of Fig. 1; Fig. 4 is a view corresponding to the right hand end of Fig. 2 and also corresponding to a section taken on line 4—4 of Fig. 5, and showing a modification of the expanding and collapsing means shown in Fig. 2; Fig. 5 is a transverse section taken on line 5—5 of Fig. 4; Fig. 6 is a side elevation of my invention in which toggle collapsing means are provided in place of cams; and Fig. 7 is a transverse sectional view taken on line 7—7 of Fig. 6.

Referring first to Figs. 1, 2 and 3, 2 is a longitudinal shaft having at one end a head or spider 3 made with radial projections 4 arranged in pairs and providing between the projections of each pair a longitudinal slot 11, and the other or distant end of the shaft is preferably reduced in diameter as at 2^b whereby it is adapted to be received in a slotted bearing 19 against which it is shouldered. The head 3 is preferably formed with a square hub 7 having a tapered bore or socket 8 in its end adapted to fit over and be centered by a stud 21 upon a rotating shaft by which the rewinder is supported. Furthermore, the square end of the hub 7 fits between lugs 22 on a rotated member 20^a which may be frictionally driven by a member 20. The present invention, however, is not concerned with the particular means for driving the rewinder.

5 are four longitudinal bars each respectively fitting one of the slots 11 in the head 3 and hinged therein by a transverse pin 6. As shown, these pins are preferably adjacent to the web side of the slots so as to leave a greater guiding capacity to the slots for the heel extensions 5^c of the bars. The bars have their free ends 5^a beveled on their inner corners as at 5^b, and said free ends of the bars are guided in longitudinal slots 10 in a sliding sleeve 9 movable longitudinally on the shaft 2. The bottom portions of the slots 10 are inclined, as at 12, providing cam surfaces for operating upon the beveled surfaces 5^b of the bars. The angle of the inclined cam surfaces 5^b of the bars is the same as the angle of the cam surfaces 12 when the sleeve is moved toward the head 3 for ex-

panding the rewinder, as shown in Fig. 1. In this position, the outer edges of the bars 5 are preferably parallel, in which case they would lie in the perimeter of a cylinder whose axis would be coincident with the axis of the shaft 2.

As shown in Fig. 2, the shaft 2 is reduced in diameter along a portion of its length, as at 2^a, and providing a shoulder 2^c between the said part 2^a and the main part adjacent to the bars, and it will be understood that when the sliding sleeve 9 is moved to the position shown in Fig. 1, it contacts with the shoulder 2^c to limit its movement when expanding the rewinder. The sleeve 9 is, furthermore, slotted and is held against rotation upon the shaft by the spline 14 arranged along the part 2^a of the shaft and also received in the longitudinal slot in the sleeve. The relation of the slot and the spline 14 is more clearly indicated in Fig. 5. When the sleeve is moved to the expanding position, it is as shown in Fig. 1, and when it is moved to the collapsing position, it is as shown in Fig. 2, and its movement in this latter direction is limited by reason of resting against the collar 15, said collar being limited in its movement to the right by the stud or pin 18 in the shaft portion 2^a. It is manifest, that if the screw or pin 18 is not employed, the stud or pin 17 will act as a limit stop for the sliding sleeve 9. It is, therefore, not important whether the collar 15 or the stud 17 limit the collapsing movement of the sleeve 9. The principal purpose of the screw or pin 18 is to normally retain the locking collar 15 upon the shaft and to permit it to be removed when dismantling or taking the rewinder apart.

The sleeve 9 is preferably provided with a milled hub 13 by which it may be grasped and moved. The locking collar 15 is circular and bored to slidably fit the shaft portion 2^a and is slotted at 16 to permit its movement longitudinally upon the shaft portion 2^a, notwithstanding the presence of the stud 17. In Fig. 2, it will be seen that when the collar 15 is moved to its extreme unlocking position, this stud 17 is within the slot 16. When, however, the sleeve 9 is moved to the expanding position, the locking collar 15 is moved to the left over the stud 17, and thence, by a partial rotation, the slot 16 is moved out of alinement with the stud and thereafter the collar forms a spacing block between the stud 17 and the hub of the sliding sleeve 9, with the result that the latter is then locked in its expanded position, as shown in Fig. 1. The perimeter of this collar 15 is preferably milled, as shown.

Owing to the fact that the fulcrum pins 6 are at some distance from the end of the bars 5, the outer edges of said bars will rise in a radial direction to a higher position than would be the maximum radial position of the outer edges of the bars between the fulcrums or pins 6 and the free ends 5^a of the bars, and which, when the bars are collapsed, would make the extended ends 5^c bind upon the paper or other web roll formed about the bars, and thereby make it more difficult to remove the same when the rewinder was collapsed. To prevent this difficulty, the ends 5^c of the bars, beyond the fulcrum pin 6, are beveled on their outer edges, as at 5^d, to such an extent that when the bars are collapsed, as in Fig. 2, these beveled edges 5^d will lie in substantial alinement as would constitute continuations of the bars 5 when in the expanded position of Fig. 1, and thereby prevent the objectionable binding upon the inner portions of the roll of paper or other web.

From the foregoing description, it will be seen that the longitudinal bars 5 are positively hinged at one end and with their greatest width held radially by the slots 11, and have their free ends 5^a relatively positioned and guided in slots 10 provided by the sliding sleeve 9, the slots in which also cooperate in holding the greatest width of the bars in a radial direction whereby the narrow edges of the bars alone contact with the interior of the paper or other web roll. It will also be seen that as the sleeve 9 is splined upon the shaft 2, it revolves positively with the shaft, and consequently the slotted portions 10 of the sleeve support and positively drive the ends 5^a of the bars in a rotary path just as positively as is accomplished at the other ends of the bars by the head or spider 3. Furthermore, the heel extensions 5^c of the bars 5 rest upon the bottom of the slots 11 when the bars are fully expanded to the position shown in Fig. 1, so that the said bars have only a limited rotary movement and consequently are more satisfactory to handle and prevent the disengagement of the ends 5^a with the slots in the sleeve 9 at any time during the normal operation of the device.

The operation of the rewinder will now be understood. When the parts are positioned, as shown in Fig. 1, the end of the paper or other web is wrapped about the parallel bars 5 and is clamped thereon by the initial rotation of the winder, and thereafter, the winder in rotating, whether continuously or intermittently, winds the web into roll form wherein the layers of the web press one upon the other. When the pressure is on the bars, due to the web being tightly wound on the rewinder, the pressure of the bars on the cam sleeve 9 causes it to press upon the locking collar 15 and thereby prevents it turning upon the shaft 2^a. When it is desired to remove the web roll, the winder is removed from the machine by lifting the end 2^b out of the bearing 19 and withdrawing the winder from the stud 21. The collar

15 is then rotated until the slot 16 thereof is brought into alinement with the stud 17. The collar is then moved over the stud until it comes in contact with the stud or pin 18, as shown in Fig. 2. Thereafter, the sleeve 9 is moved toward the collar until it rests in contact with it, as shown in Fig. 2, permitting the free ends of the bars 5 to move toward each other. When this condition of the parts is obtained, the bars will have collapsed relatively to the roll of webbing and will have removed the friction thereon, whereupon the winder in its collapsed condition may be withdrawn from the web roll by pulling upon the head 3 or by resting the shaft end 2^b upon the floor and pushing the web roll downward toward the collapsed ends of the bars and from which it may be readily removed. It will be seen that when the collapsed condition of the bars takes place, as in Fig. 2, the beveled ends 5^d on the edge of the heel extensions 5^c of the bars do not rise above the main edges of the bars when in their expanded condition shown in Fig. 1, and consequently do not put any binding action upon the roll even where the web is of a width which would extend over the fulcrum pins 6.

While I have shown in Figs. 1, 2 and 3, the construction of my improved winder wherein four collapsible bars 5 are employed, it will be understood that it will suffice if two of said bars only are made collapsible, and this modification is shown in Figs. 4 and 5 which illustrate the sliding sleeve end of the winder. The only difference in the construction shown in Figs. 4 and 5 from what is shown in Figs. 1 and 2 resides in the fact that the beveled edges 5^b of two of the bars are omitted and the slots 10^a which receive the modified bars do not have inclined or cam-shaped bottoms 12, but instead, the bottoms of the slotted portions 10^a are parallel to the axis of the shaft 2, and consequently the flat ends 5^c of the bars which fit them permit the sliding sleeve to be shifted without collapsing said bars. The remaining two bars, however, are adapted to be collapsed or expanded as shown in Figs. 4 and 5, precisely in the same manner that all of the bars are collapsed or expanded in Figs. 1 and 2.

Referring to the modification shown in Figs. 6 and 7, the bars 5, 5^x are hinged to the head or spider 3, as in the case of Figs. 1 and 4, but the manner of supporting two of the bars against collapsing and the remaining two bars for collapsing is differently constructed in this case than in either of the other constructions of said figures. In this case, the bars 5^x are held in definite positions parallel to the axis of the winder by means of arms 24 fixedly bolted to the shaft 2 of the winder. In the case of the remaining two bars 5, these are connected with a sliding sleeve 9^b by links 23, said links being hinged at one end to the sleeve at 26^a and at the other end to the bars 5 by pins 26. The sleeve 9^b is slidably mounted upon the shaft 2 and held thereon against rotation and otherwise is combined with the hub part 13 and locking collar 15 in all material respects similar to the corresponding parts previously described. In the present case, the shaft 2 is made square where it receives the sleeve and the sleeve is provided with a square hole fitting the shaft, and thereby is held against rotation thereon. It will be understood, however, that the arrangement of the sleeve upon the shaft may be the same as in Figs. 1 to 5, if so desired. It will now be understood that when the sleeve is reciprocated, the bars 5 are collapsed or expanded under the action of the link and sleeve. In Figs. 6 and 7, the parts are shown in their expanded condition, but when the sleeve is moved to the right, the links will pull the free ends 5^a of the bars downward toward the shaft in a positive manner.

While I have shown two of the four bars collapsible in Figs. 4 to 7, inclusive, I do not restrict myself in that respect, as one or more bars may be collapsible to provide a capacity to release the roll of paper or other material. In view of the fact that in some machines, the web is tightly wound upon the rewinder, it is desirable that more than one of the bars shall be collapsible and, in the preferred form, all of the bars are collapsible.

The rewinder embodying my improvements is simple in construction and operation and embodies a minimum of working parts and consequently is not liable to get out of working order. Furthermore, the collapsible bars are hinged on fixed fulcrum pins at one end and are, therefore, collapsible throughout their entire length when releasing the paper roll, and all of the collapsing means are arranged at the end most distant from the fulcrum points. All adjusting screws or clamping devices requiring the operation of screws, nuts or bolts are eliminated, thereby simplifying the construction of the winder.

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.

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

1. A collapsible rewinder, comprising a shaft adapted to be supported and rotated, combined with a plurality of longitudinal bars having their outer edges parallel with the axis of the shaft when said bars are in expanded position, one or more of said bars being hinged at one end to the shaft and radially collapsible at the other end relatively to the shaft, means slidably mounted upon the shaft for supporting and radially adjusting the free ends of the collapsible bars, and locking means for holding the slidable means in its position of adjustment for holding the bars in expanded condition, and wherein further, the slidable means is provided about its perimeter with slots receiving the ends of the bars and having portions of those of the slots which receive the expansible members of said bars formed with cam surfaces whereby said bar or bars are collapsible when the sleeve is shifted in one direction and radially expanded when the sleeve is adjusted in the opposite direction.

2. A collapsible rewinder, comprising a shaft adapted to be supported and rotated, combined with a plurality of longitudinal bars having their outer edges parallel with the axis of the shaft when said bars are in expanded position, one or more of said bars being hinged at one end to the shaft and radially collapsible at the other end relatively to the shaft, means slidably mounted upon the shaft for supporting and radially adjusting the free ends of the collapsible bars, and locking means for holding the slidable means in its position of adjustment for holding the bars in expanded condition, and wherein further, the locking means comprises a pin projecting from the shaft and a collar sleeved upon the shaft and having a longitudinal slot to permit the collar to be moved longitudinally of the shaft over the pin and to a position intermediate of said pin and the slidably mounted means, and in which position the collar is rotatable to move its slotted portion out of alinement with the pin, and whereby the collar fills the space between the pin and the slidable means.

3. A collapsible rewinder, comprising a shaft adapted to be supported and rotated, combined with a plurality of longitudinal bars having their outer edges parallel with the axis of the shaft when said bars are in expanded position, one or more of said bars being hinged at one end to the shaft and radially collapsible at the other end relatively to the shaft, means slidably mounted upon the shaft for supporting and radially adjusting the free ends of the collapsible bars, and locking means for holding the slidable means in its position of adjustment for holding the bars in expanded condition, and wherein the slidable means is provided with slotted portions for receiving the ends of the bars and which slotted portions have cam surfaces in the bottoms of their slots for operating upon the bar or bars which are radially movable.

4. A collapsible rewinder, comprising a shaft adapted to be supported and rotated, combined with a plurality of longitudinal bars having their outer edges parallel with the axis of the shaft when said bars are in expanded position, one or more of said bars being hinged at one end to the shaft and radially collapsible at the other end relatively to the shaft, means slidably mounted upon the shaft for supporting and radially adjusting the free ends of the collapsible bars, and locking means for holding the slidable means in its position of adjustment for holding the bars in expanded condition, and wherein the slidable means comprises a sleeve-like structure loosely splined to the shaft so as to positively rotate with it and having radial slots in which the ends of the bars are received and guided, and wherein further, cam means are arranged between the bottoms of the slots and the bars which are radially movable whereby said bars may be expanded or collapsed by the reciprocations of the sleeve.

5. A collapsible rewinder, comprising a shaft adapted to be supported and rotated, combined with a plurality of longitudinal bars having their outer edges parallel with the axis of the shaft when said bars are in expanded position, one or more of said bars being hinged at one end to the shaft and radially collapsible at the other end relatively to the shaft, means slidably mounted upon the shaft for supporting and radially adjusting the free ends of the collapsible bars, and locking means for holding the slidable means in its position of adjustment for holding the bars in expanded condition, and, wherein further, the ends of the bars adjacent to their hinges are provided with heel extensions which are guided in slotted portions of a head or spider secured to the shaft, said heel extensions beveled at their outer edges so that when the collapsible bars are collapsed, the said heel extensions shall not project beyond the normal maximum alinement of the bars in their expanded conditions.

6. A collapsible rewinder, comprising a shaft adapted to be supported and rotated, combined with a plurality of longitudinal bars having their outer edges parallel with the axis of the shaft when said bars are in expanded position, one or more of said bars being hinged at one end to the shaft and radially collapsible at the other end relatively to the shaft, means slidably mounted

upon the shaft for supporting and radially adjusting the free ends of the collapsible bars, and locking means for holding the slidable means in its position of adjustment for holding the bars in expanded condition, and wherein further, the ends of the bars adjacent to their hinges are provided with heel extensions which are guided in slotted portions of a head or spider secured to the shaft, said heel extensions contacting with the bottoms of the slots to prevent the other or distant ends of the bars from disengagement with the slidably mounted means.

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

WALTER C. FELLOWS.