June 10, 1930. F. P. DAHLSTROM 1,762,289

COIL HANDLING APPARATUS

Filed Dec. 27, 1927 3 Sheets-Sheet 1

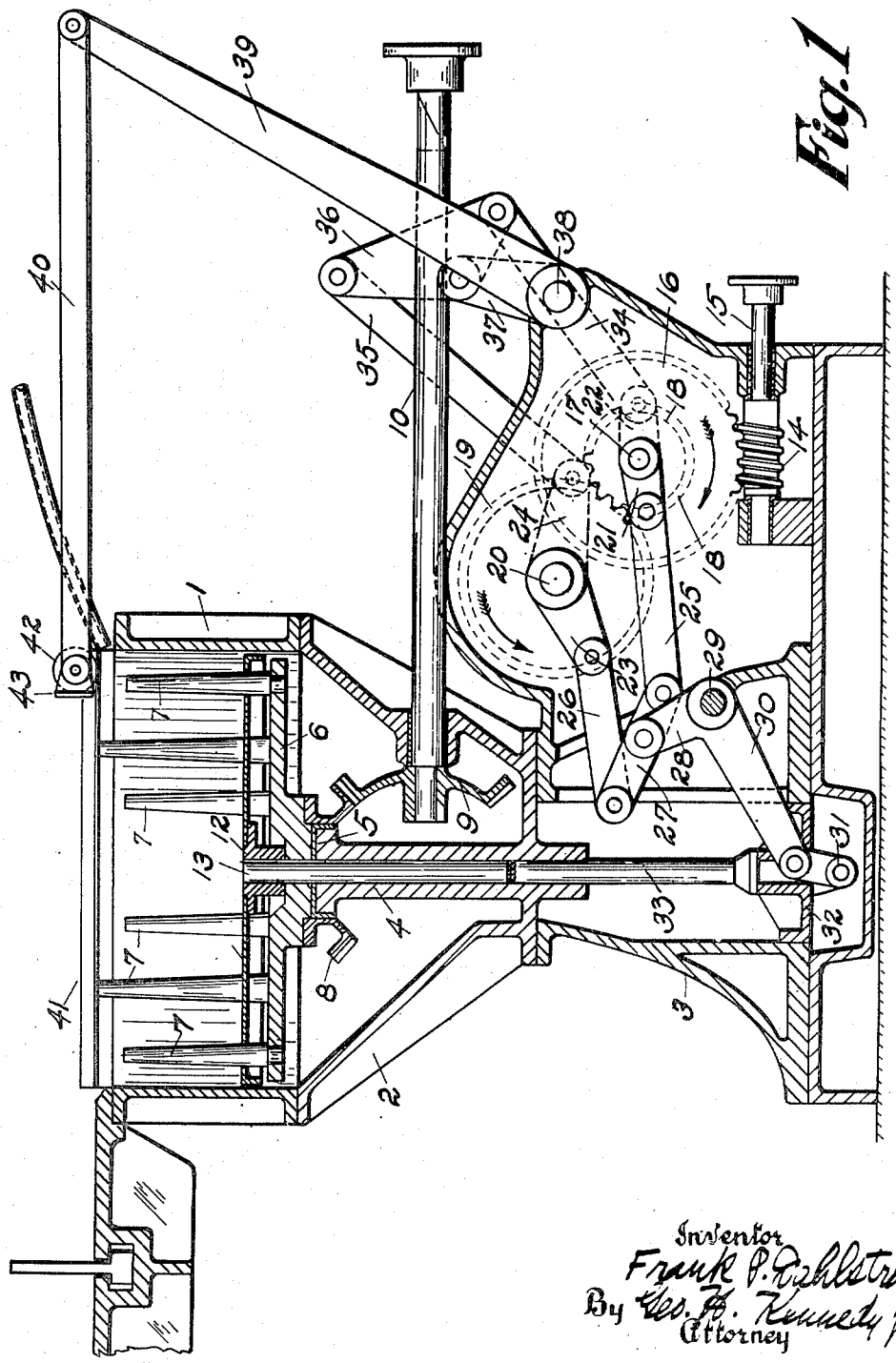


Fig. 1

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COIL HANDLING APPARATUS

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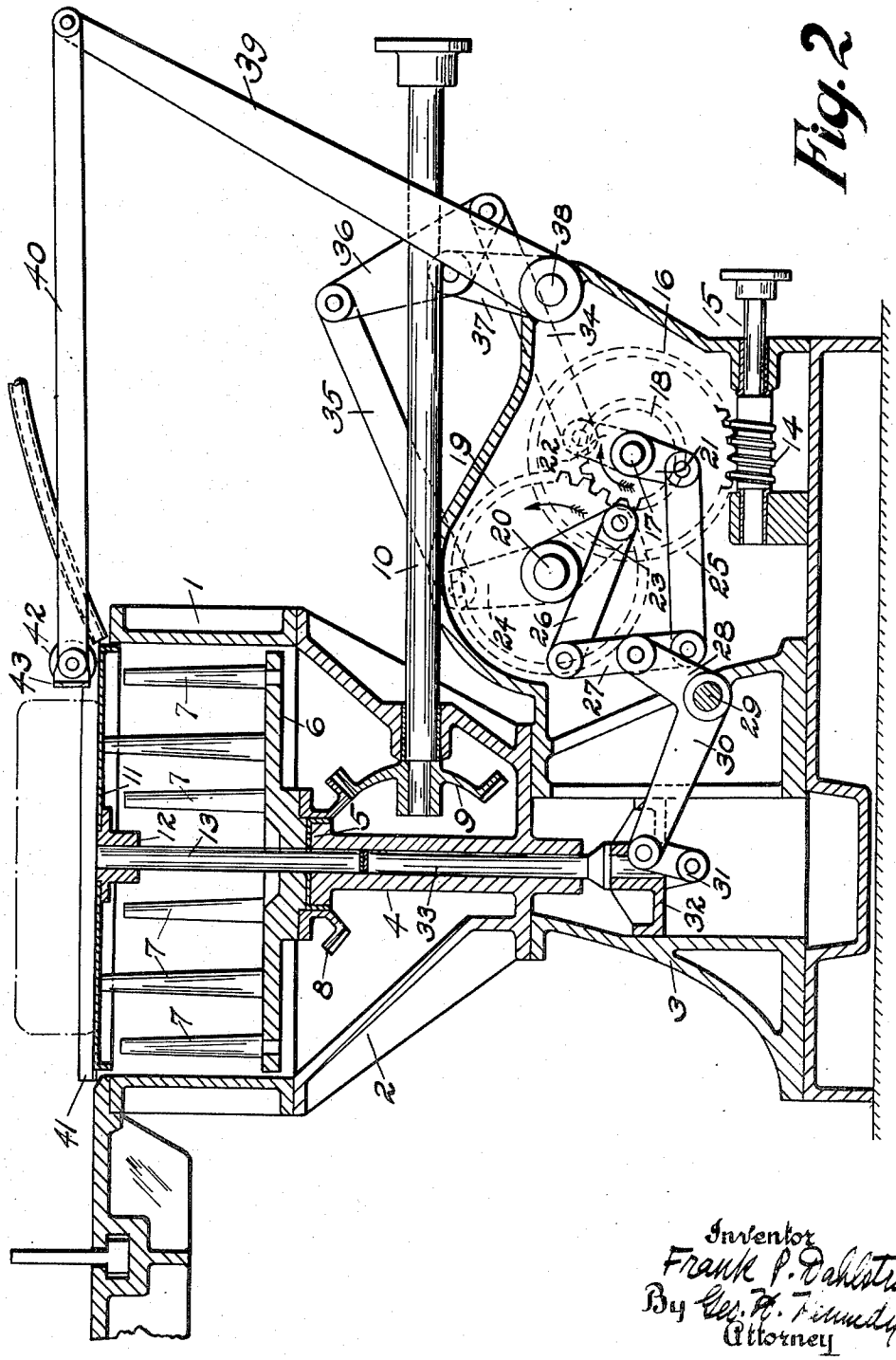


Fig. 2

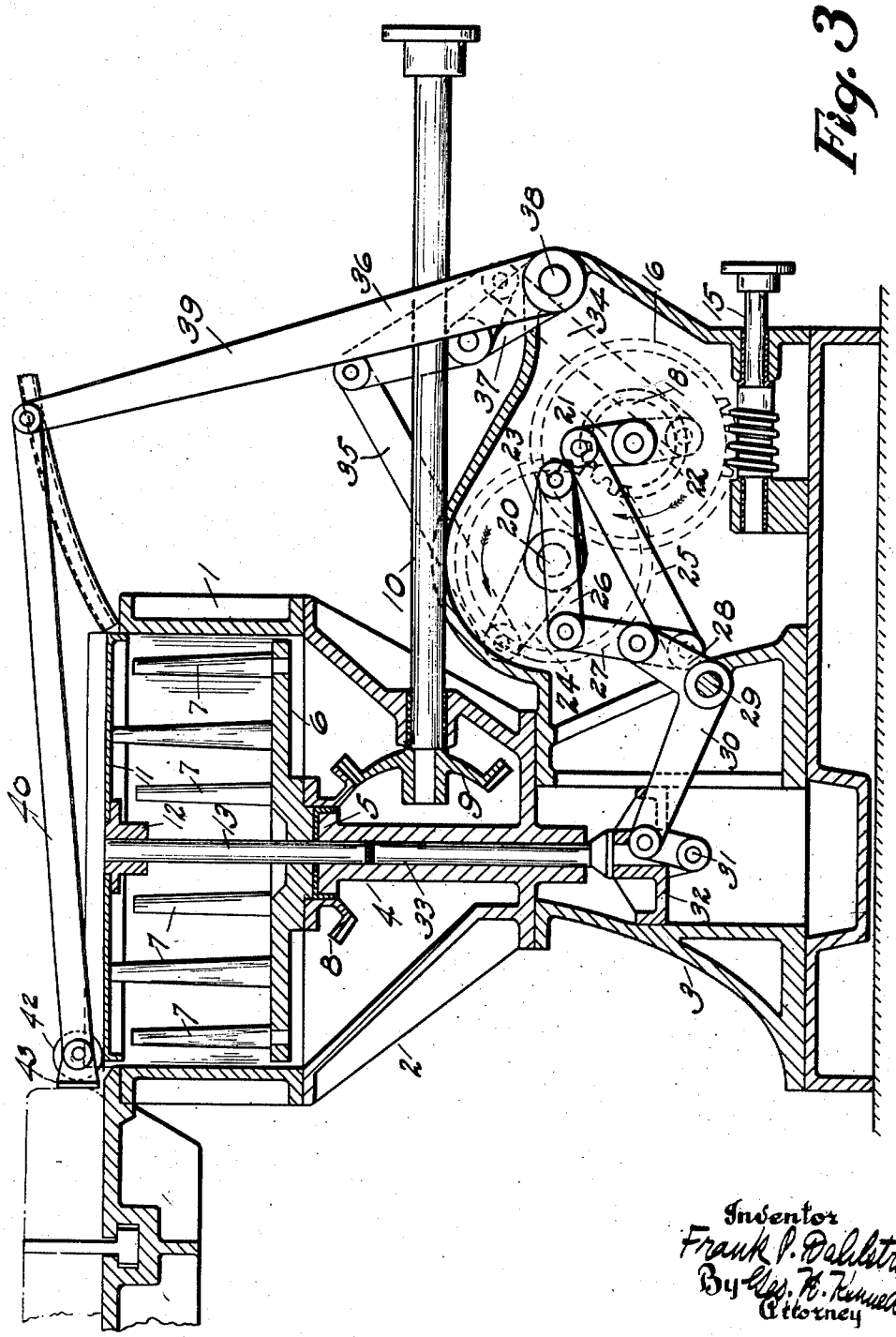
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Fig. 3



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UNITED STATES PATENT OFFICE

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COIL-HANDLING APPARATUS

Application filed December 27, 1927. Serial No. 242,915.

The present invention relates to apparatus for handling coiled material, and in particular involves the provision of mechanism for securing successively the elevation, from a reeling device, of each coil that is formed thereon, and the sidewise transfer of each coil so elevated to a conveyor or the like, whereby the reeling device is rendered immediately available for the formation of another coil.

The invention resides in the combination and arrangement of parts hereinafter set forth in detail, reference being had to the accompanying drawings, in which—

Fig. 1 is a view, partly in section and partly in side elevation of the mechanism embodying my invention, as applied to a reeling or coil-forming device of well-known construction.

Fig. 2 is a fragmentary view illustrating the parts in positions that they take for the elevation of the completed coil.

Fig. 3 is a view similar to Fig. 2, illustrating the parts in the positions that they take for the lateral delivery movement of the elevated coil.

Like reference characters refer to like parts in the different figures.

Referring first to Fig. 1, the coiling device or reel is suitably disposed within a cylindrical casing or shell 1, the latter being supported in any desired way, as by a hollow standard or base preferably made in two parts, namely an upper part 2 and a lower part 3. The upper part 2 provides a central internal sleeve 4, which sleeve, as here shown, has a circular enlargement 5 at its upper end, for the rotative support of the reel or coiling device proper.

Said reel or coiling device as here shown consists of a circular plate 6 disposed within the casing or shell 1 and having two circular series of upstanding guide fingers 7, 7 for the confinement of the convolutions of the coil. Secured to the plate 6 is a bevel gear 8 whose hub finds bearing on the circular enlargement 5 of the sleeve 4; a driving bevel gear 9 meshes with the gear 8, said bevel gear 9 being secured to the end of a suitably journalled driving shaft 10 that is rotated, during each reeling or coil-forming operation from any suitable source of power, thereby to revolve the reel at such a speed as will form the moving material (hot wire, rods, or other stock) as delivered to said reel into a coil, with the successive convolutions confined between the sets of fingers 7, 7.

Each such coil thus laid or formed by directing the moving material into the revolving reel, finds its bottom support on a plate 11 which overlies the plate 6 and which is apertured for the passage of the guide fingers 7, 7 therethrough. Said plate 11 is supported independently of the plate 6, being carried by a member 12 which is secured to the upper end of a rod 13, the latter being slidable in the bore of the sleeve 4. The member 12, in the normal coil-receiving position of plate 11 as shown in Fig. 1, rests upon the center of the plate 6, and during formation of the coil, the entire structure within the shell 1 is rotated by the driving shaft 10. Upon completion of the coil-forming or laying operation, the rotation of shaft 10 is discontinued, and thereupon is inaugurated the operation of certain mechanism, now to be described, for elevating the completed coil above the guiding fingers 7, 7, and for then shifting said coil laterally away from the reel, so as to make room for the immediate resumption of the coiling operation on the next piece of stock.

Still referring to Fig. 1, the numeral 14 indicates a worm carried by a driving shaft 15, which shaft, upon discontinuance of the rotation of shaft 10, is caused in any suitable manner to rotate so as to carry the coil lifting and shifting mechanism through a complete cycle of operations, and then to bring said mechanism to rest in its starting position. The worm 14 meshes with a worm gear 16 on a shaft 17, and the latter carries a gear 18 in mesh with a larger gear 19 on a shaft 20,—the relation of the gearing being such that two complete revolutions of the shaft 17 are required for a single revolution of the shaft 20. The shaft 17 carries two crank arms 21 and 22 which are nearly 180° apart, and the shaft 20 carries two crank arms 23 and 24 having a similar angular re-

lationship. Links 25 and 26 standing substantially parallel in a position of rest pivotally connect the crank arms 21 and 23 respectively with the ends of a member 27, the latter, at an intermediate portion having pivotal connection with the short arm 28 of a bell crank lever which is fulcrumed at 29; the long arm 30 of said bell crank is pivotally connected by a link 31 to a cross head 32 slidably carried in the lower part 3 of the supporting standard of the reel. Projecting upwardly from said cross head 32 is a rod 33 which enters the bore of sleeve 4 in abutting relation to the lower end of rod 13.

Other links 34 and 35 standing substantially parallel in a position of rest pivotally connect the other two crank arms 22 and 24 respectively to the ends of a member 36, the latter, at an intermediate point having a pivotal connection with the short arm 37 of a bell crank lever which is fulcrumed at 38. The long arm 39 of this bell crank lever extends upwardly and at its free end makes a pivotal connection with a member 40 whose other end is supported, in juxtaposition to the reel, by means of a track 41 extending horizontally above said reel. A roller 42 on the end of member 40, is adapted to travel on said track 41 thereby at the proper time to act upon the completed and elevated coil with a pusher bar 43, carried by the ends of said member 40. The operation of the mechanism is as follows:—

Assume the parts to be in the positions illustrated by Fig. 1 when, upon the completion of the coil in the reel, the rotation of driving shaft 10 is discontinued and, simultaneously the rotation of driving shaft 15 is inaugurated. At the very outset of said last-named rotation, the crank arm 21 moving clockwise and the crank arm 23 moving anti-clockwise, these arms nevertheless travel in the same general direction, viz, to the right in Fig. 1 and as a consequence of their combined movement, through nearly one full revolution of shaft 17, and nearly a half revolution of shaft 20, as shown in Fig. 2, they pull the member 27, through links 25 and 26, well to the right; this causes a clockwise angular movement of the bell crank 28, 30 on its fulcrum 29, which thrusts the cross head 32 upwardly and, through the action of rods 33 and 13, raises the plate 11 far enough so that the completed coil is clear of the fingers 7, 7.

During this first nearly complete revolution of the shaft 17, the crank arms 22 and 24 (unlike the crank arms 21 and 23) have been neutralizing each other's effect on the member 36, with the result that no appreciable displacement in the position of said member 36 is effected in this first part of the cycle of operations, although the links 34 and 35 are carried from the positions shown in Fig. 1 into the positions shown in Fig. 2.

However, as the rotation of shafts 17 and 20 continues, from the position illustrated in Fig. 2, this inactivity of the member 36 (except to swing idly on its pivotal connection with arm 37) no longer prevails; on the contrary said member 36, during the next portion of the rotation is drawn bodily to the left by the links 34 and 35, causing the arm 39 to move sharply from the position of Fig. 2 into the position of Fig. 3. This carries the pusher 43 of member 40 against the elevated coil on plate 11 and forces said coil bodily to the left off the surface of said plate. Said plate 11 during this pushing operation remains substantially stationary, due to the fact that the member 27, by the neutralizing action of links 25 and 26, is not at this time moved bodily, but only swings idly on its point of pivotal connection with the bell crank arm 28.

The balance of the cycle operations, to complete two full revolutions of shaft 17 and one full revolution of shaft 20 is operative to shift both members 27 and 36 bodily, the member 27 through the thrust of links 25 and 26 moving to the left from the position of Fig. 3 to the position of Fig. 1 and thereby depressing rod 33 so that plate 11 will resume its lowered position within the reel,—and the member 36 being thrust to the right by the links 34 and 35 so that the arm 39 retracts the pusher 43 from the position of Fig. 3 to the position of Fig. 1. This completes the cycle of operations and leaves the reel free for the formation of another coil, whereupon the rotation of the shaft 15 is again inaugurated, to impart two complete revolutions to the shaft 17 and one complete revolution to the shaft 20.

Heretofore, the operation of removing a coil from a reel, where it involves the successive actuations of two different members, namely, one to free the coil and the other to push the freed coil away, has required separate actuators for said members,—a condition which imposes a heavy burden of responsibility on the operator in securing the properly-timed actuations of the parts. For example, in the well-known arrangement of the McIlvried Patent No. 452,889, of May 26, 1891, where a fluid pressure piston and cylinder unit is employed for the actuation of the coil freeing member, and another separate piston and cylinder unit is employed for the actuation of the coil-pushing member, the operator is required, after completion of each coil, to perform four separate acts, in properly-timed relation, viz, (1), to admit pressure fluid to the first unit, for the actuation of the coil-freeing member; (2), after lapse of a proper interval, to admit pressure fluid to the second unit, for the actuation of the pusher; (3), to admit pressure fluid for the reversal of the second unit, to carry the pusher back out of the way of the coil-freeing member; and (4), to admit pressure fluid for the

reversal of the first unit, to return the coil-freeing member to normal position.

According to my invention however, which provides a single actuator, common to both the coil-freeing and the coil-pushing members, the operator is entirely relieved of all responsibility; all that he has to do, after the completion of each coil on the reel, is to inaugurate the rotation of shaft 15 by clutching it to a motor or the like, not shown, which procures, as previously stated, a single complete revolution of the shaft 20 and then stops.

I claim,

1. In apparatus of the class described, the combination with the coil-freeing member and coil-discharging pusher of a coiling reel, of an actuating mechanism, common to said member and pusher, for coordinating their movements in the handling of each coil formed on said reel, to secure first the coil-freeing movement of said member, then the operative movement of said pusher, and finally the simultaneous return of both parts to their normal positions, said actuating mechanism comprising two shafts rotating in opposite directions and at different speeds, means connecting each shaft to said member for the operation of the latter by the combined initial angular movements of the two shafts, and other means connecting each shaft with said pusher for the operation of the same, after the coil-freeing movement of said member, by the combined subsequent angular movements of both shafts.

2. In apparatus of the class described, the combination with the coil-elevating plate and coil-discharging pusher of a coiling reel, of an actuating mechanism, common to said plate and pusher, for coordinating their movements in the handling of each coil formed on said reel, to secure first the elevation of said plate, then the operative movement of said pusher, and finally the simultaneous return of both parts to their normal positions, said actuating mechanism comprising two shafts rotating in opposite directions and at different speeds, means connecting each shaft to said plate for the elevation of the latter by the combined initial angular movements of the two shafts, and other means connecting each shaft with said pusher for the operation of the same, after the elevation of said plate, by the combined subsequent angular movements of both shafts, said last-named connecting means being arranged to neutralize the initial angular movements of the two shafts, whereby the pusher is held inactive during the elevation of the plate.

3. In apparatus of the class described, the combination with the coil-elevating plate and coil-discharging pusher of a coiling reel, of an actuating mechanism, common to said plate and pusher, for coordinating their movements in the handling of each coil formed on said reel, to secure first the elevation of said plate, then the operative movement of said pusher, and finally the simultaneous return of both parts to their normal positions, said actuating mechanism comprising two shafts rotating in opposite directions and at different speeds, means connecting each shaft to said plate for the elevation of the latter by the combined initial angular movements of the two shafts, and other means connecting each shaft with said pusher for the operation of the same, after the elevation of said plate, by the combined subsequent angular movements of both shafts, said first-named connecting means being arranged to neutralize said subsequent angular movements of the two shafts, whereby the plate is held stationary in its elevated position during the movement of said pusher.

4. In apparatus of the class described, the combination with the coil-elevating plate and coil-discharging pusher of a coiling reel, of an actuating mechanism, common to said plate and pusher, for coordinating their movements in the handling of each coil formed on said reel, to secure first the elevation of said plate, then the operative movement of said pusher, and finally the simultaneous return of both parts to their normal positions, said actuating mechanism comprising two shafts rotating in opposite directions and at different speeds, each shaft having a plate-operating crank and a pusher-operating crank, a pair of links, one for each plate-operating crank, and a second pair of links, one for each pusher-operating crank, means for transmitting to said plate, through said first-mentioned pair of links, the combined initial angular movements of the two shafts, for the elevation of said plate, and means interposed between said second pair of links and said pusher for absorbing said combined angular initial shaft movements, whereby to hold said pusher inactive during the elevation of said plate.

5. In apparatus of the class described, the combination with the coil-elevating plate and coil-discharging pusher of a coiling reel, of an actuating mechanism, common to said plate and pusher, for coordinating their movements in the handling of each coil formed on said reel, to secure first the elevation of said plate, then the operative movement of said pusher, and finally the simultaneous return of both parts to their normal positions, said actuating mechanism comprising two shafts rotating in opposite directions and at different speeds, means connecting each shaft to said plate for the elevation of the latter by the combined initial angular movements of the two shafts, and other means connecting each shaft with said pusher for the operation of the same, after the elevation of said plate, by the combined

subsequent angular movements of both shafts.

6. In apparatus of the class described, the combination with the coil-freeing member and coil-discharging pusher of a coiling reel, of an actuating mechanism, common to said member and pusher, for coordinating their movements in the handling of each coil formed on said reel, said actuating mechanism comprising two shafts rotating in opposite directions and at different speeds, means connecting each shaft to said member for the operation of the latter by the combined initial angular movements of the two shafts, and other means connecting each shaft with said pusher for the operation of the same, after the coil-freeing movement of said member, by the combined subsequent angular movements of both shafts, said last-named connecting means being arranged to neutralize the initial angular movements of the two shafts, whereby the pusher is held inactive during the coil-freeing movement of said member.

7. In apparatus of the class described, the combination with the coil-freeing member and coil-discharging pusher of a coiling reel, of an actuating mechanism, common to said member and pusher, for coordinating their movements in the handling of each coil formed on said reel, said actuating mechanism comprising two shafts rotating in opposite directions and at different speeds, means connecting each shaft to said member for the operation of the latter by the combined initial angular movements of the two shafts, and other means connecting each shaft with said pusher for the operation of the same, after the coil-freeing movement of said member, by the combined subsequent angular movements of both shafts, said first-named connecting means being arranged to neutralize said subsequent angular movements of the two shafts, whereby the coil-freeing member is held stationary during the operative movement of said pusher.

8. In apparatus of the class described, the combination with the coil-freeing member and coil-discharging pusher of a coiling reel, of an actuating mechanism, common to said member and pusher, for coordinating their movements in the handling of each coil formed on said reel, said actuating mechanism comprising two shafts rotating in opposite directions and at different speeds, each shaft having a crank for said member and a crank for said pusher, a pair of links connected to the two member cranks, and a second pair of links connected to the two pusher cranks, means for transmitting to said member, through said first-mentioned pair of links, the combined initial angular movements of the two shafts, to procure the coil-freeing movement of said member, and means interposed between said second pair of links and said pusher for absorbing said combined angular initial shaft movements, whereby to hold said pusher inactive during the coil-freeing movement of said member.

9. In apparatus of the class described, the combination with the coil-freeing member and coil-discharging pusher of a coiling reel, of an actuating mechainsm, common to said member and pusher, for coordinating their movements in the handling of each coil formed on said reel, said actuating mechanism comprising two shafts rotating in opposite directions and at different speeds, each shaft having a crank for said member and a crank for said pusher, a pair of links connected to the two member cranks, and a second pair of links connected to the two pusher cranks, means for transmitting to said member, through said first-mentioned pair of links, the combined initial angular movements of the two shafts, to procure the coil-freeing movement of said member, and and means interposed between said second pair of links and said pusher for absorbing said combined angular initial shaft movements, whereby to hold said pusher inactive during the coil-freeing movement of said member, said last-named means adapted to transmit to said pusher the combined subequent angular shaft movements, for the operation of said pusher after the coil-freeing movement of said member.

10. In apparatus of the class described, the combination with the coil-freeing member and coil-discharging pusher of a coiling reel, of an actuating mechanism, common to said member and pusher, for coordinating their movements in the handling of each coil formed on said reel, said actuating mechanism comprising two shafts rotating in opposite directions and at different speeds, with connections from both shafts to said member and to said pusher, adapted to secure, by the initial combined angular movements of said shafts, the coil-freeing movement of said member, and by the subsequent combined angular movements of said shafts, the operative movement of said pusher, and by the final combined angular movements of said shafts, the simultaneous return of both member and pusher to their normal positions.

Dated this 20th day of December, 1927.

FRANK P. DAHLSTROM.