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C. AARON ET AL

2,877,959

SHAFT INJECTOR FOR REWIND MACHINE

Filed Aug. 9, 1954

5 Sheets-Sheet 1

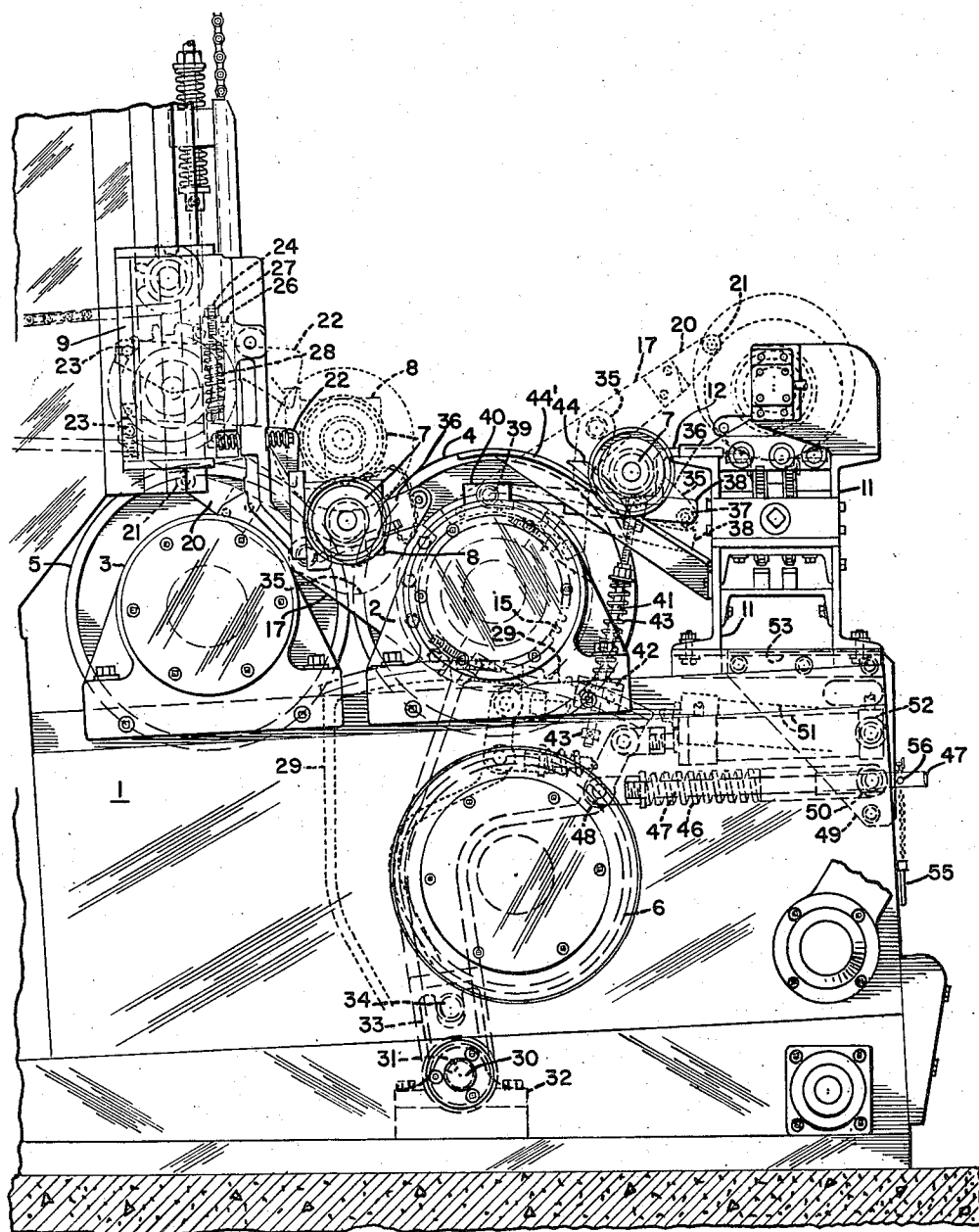


FIG. 1.

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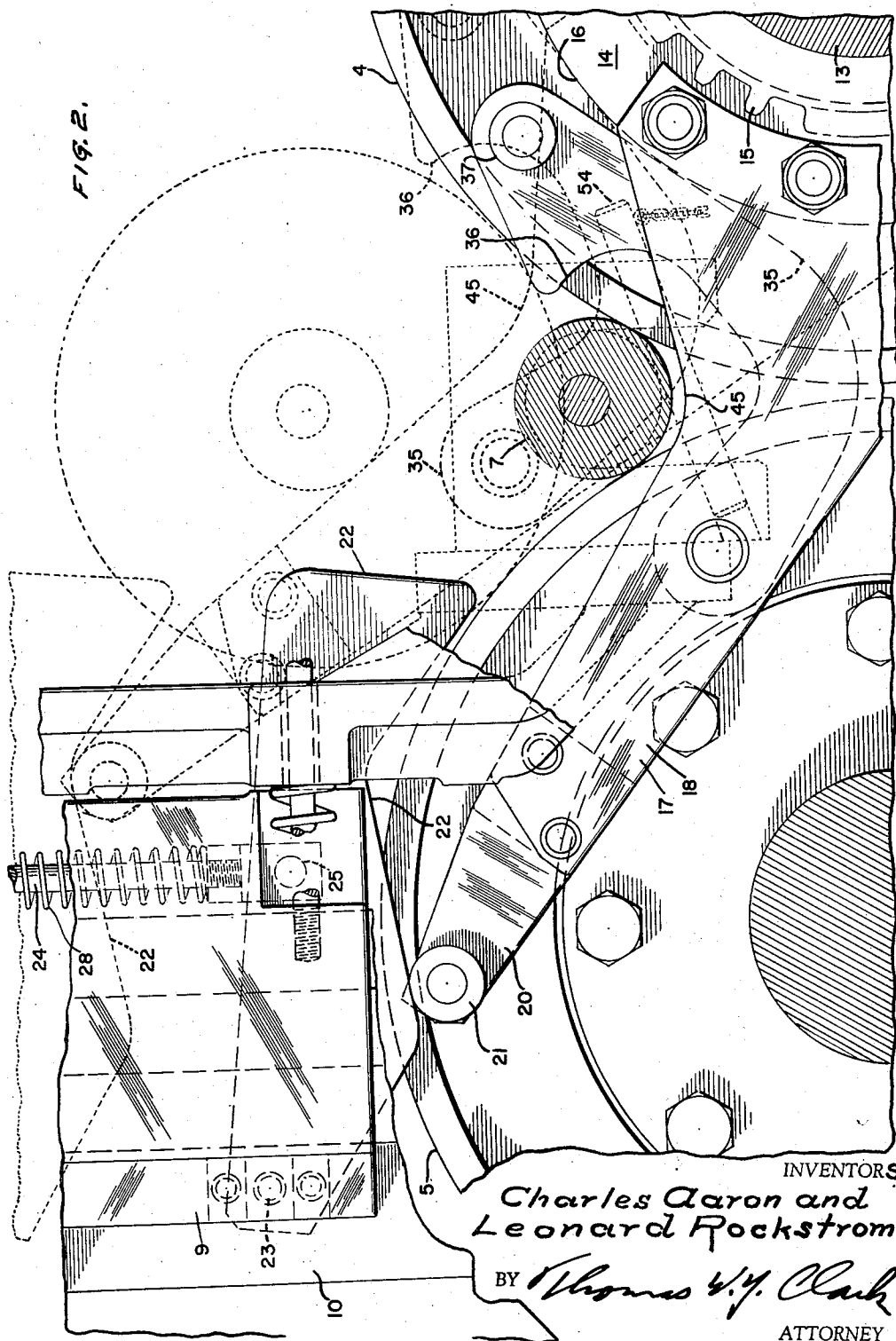
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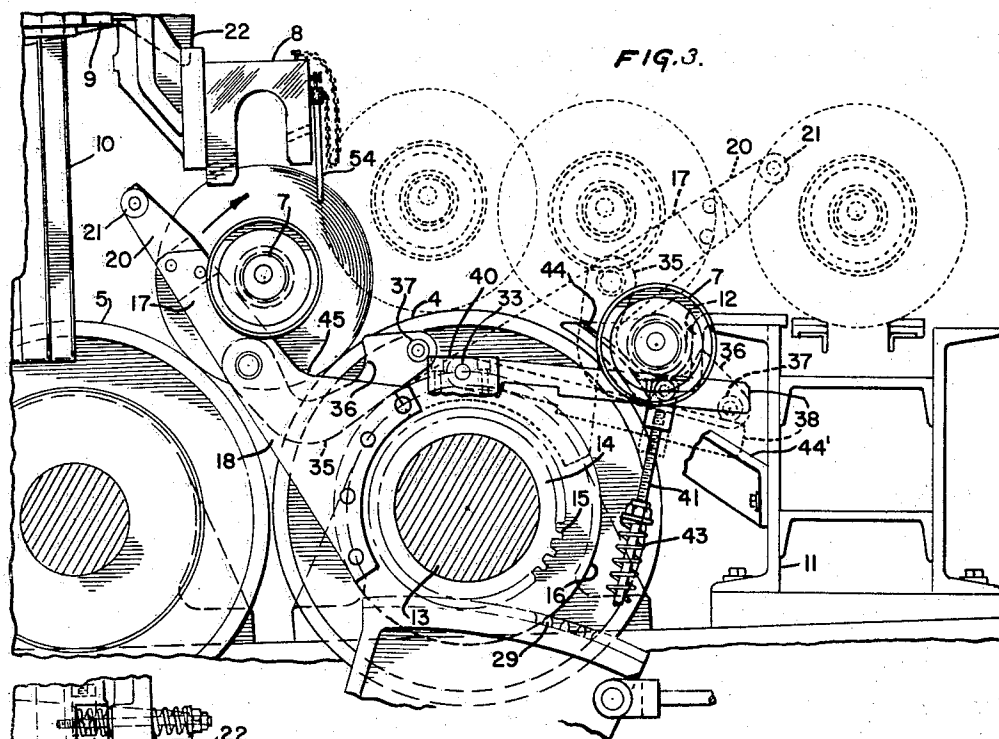
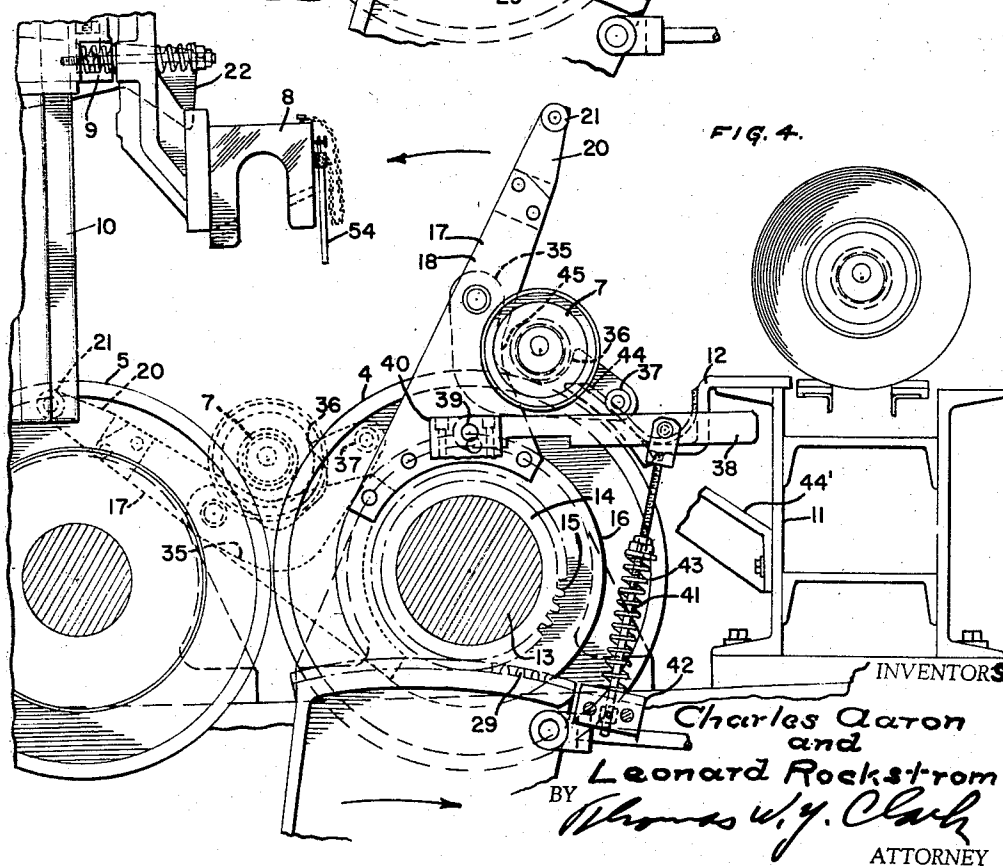
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SHAFT INJECTOR FOR REWIND MACHINE

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5 Sheets-Sheet 3



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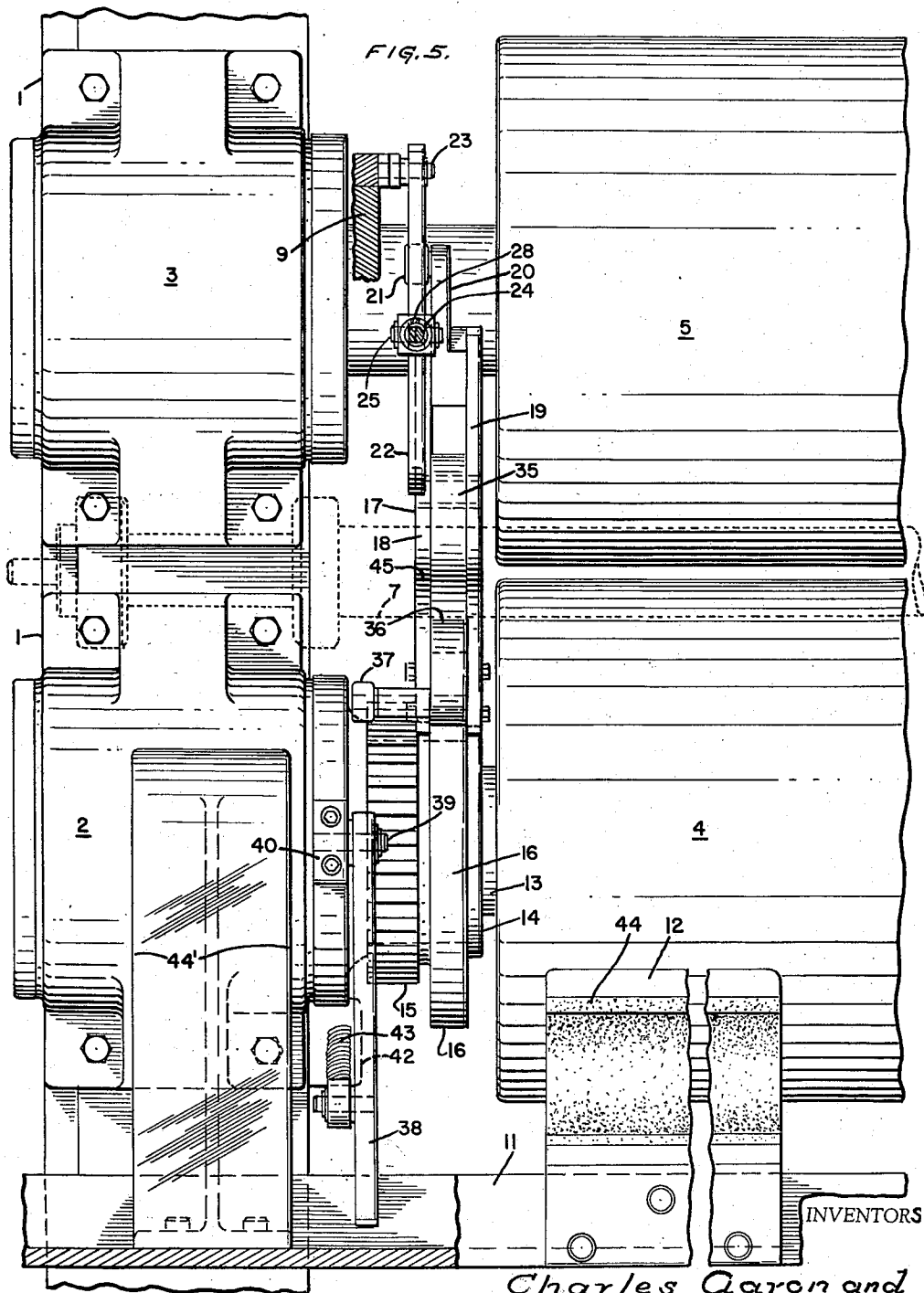
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5 Sheets-Sheet 4



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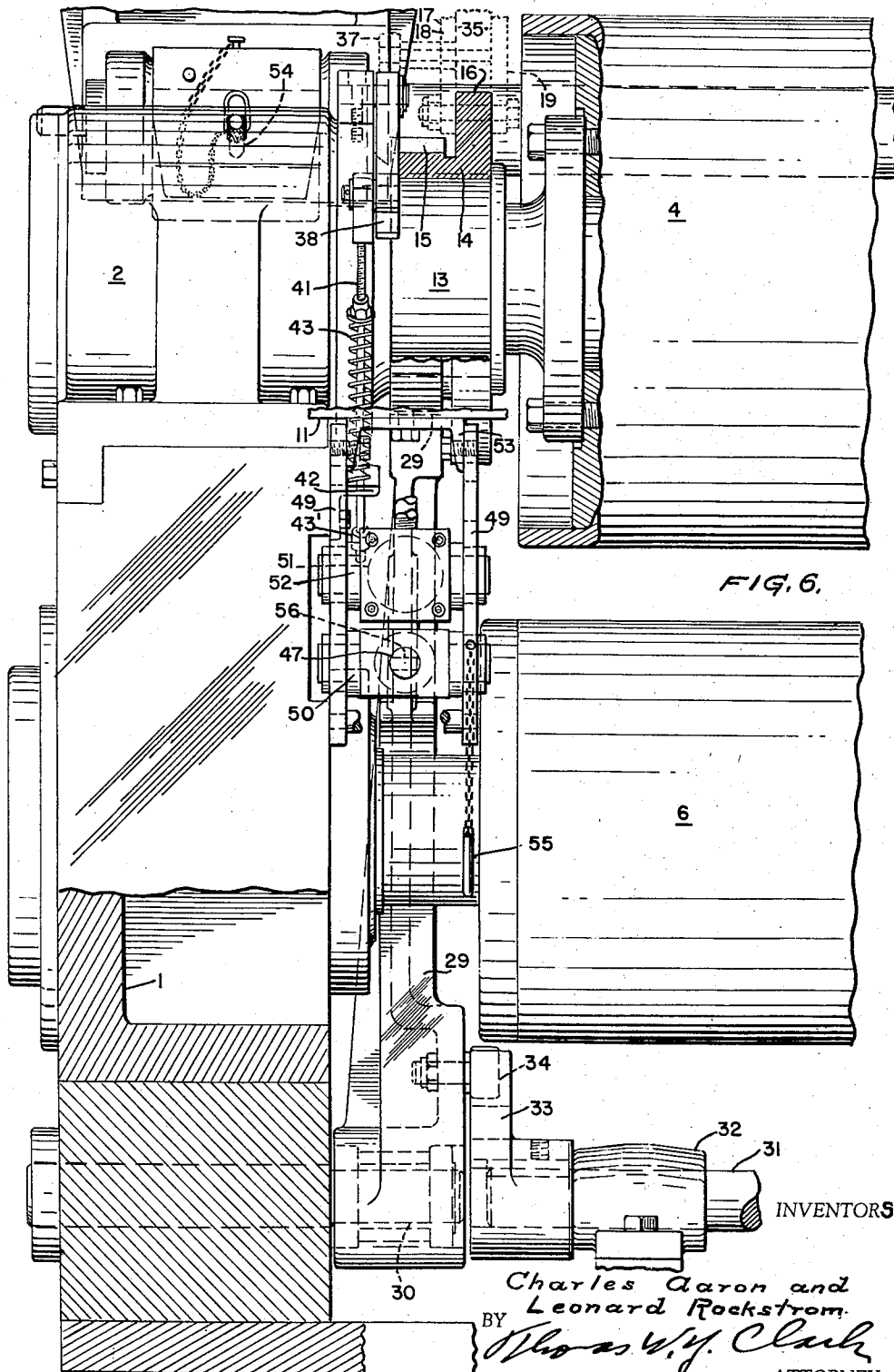
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SHAFT INJECTOR FOR REWIND MACHINE

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2,877,959

SHAFT INJECTOR FOR REWIND MACHINE

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Application August 9, 1954, Serial No. 448,580

14 Claims. (Cl. 242—66)

This invention relates to a rewind shaft injector or loader and a web roll ejector. It is primarily useful in a winding or rewinding machine such as that shown in pending application Serial No. 390,002 filed November 3, 1953, Patent No. 2,743,879. The instant application is a companion case to that filed substantially contemporaneously herewith for Counter Roll Stripper by Leon A. Schmidt and Leonard Rockstrom, Serial No. 448,579 filed August 9, 1954.

Paper or other material is unwound from a mill roll and rewound in a rewind machine like that of the first mentioned application above. Prior to effecting the rewinding the web is slit into narrower widths. The running web after slitting is rewound on a rewind shaft in the valley between closely spaced parallel winding rolls by surface contact with those rolls. The paper is initially wound upon the rewind shaft mounted in bearings at each end of the winding rolls and those bearings move upwardly as the web or paper accumulates on the shaft. The shaft with the paper thereon is rotated by the winding rolls, both rolls being rotated in the same direction. Although the rewind shaft has generally been lowered between the winding rolls by hand, it has been found that lowering it mechanically into the valley between the rolls where it is engaged by the bearings at each end is far superior in avoiding injury to the winding rolls and the shaft and in obtaining speedy and accurate alignment of the rewind shaft with the bearings for that shaft.

In the application first above mentioned there is shown a web roll ejecting mechanism and that mechanism works most effectively for rolls which have been wound large. The apparatus of the present invention is intended for application to a rewinding machine having the ejecting mechanism as described in said application but the apparatus of the instant invention is intended to eject counter rolls, or rolls that are wound much smaller and whose rapid ejection with the corresponding re-supply of a further shaft for further winding is most desirable.

Among the objects of the present invention, therefore, is to construct a combination web roll ejector and rewind shaft injector. In the instant invention the rewind shaft is grasped at the same time the completed counter roll is ejected and in the rearward movement of the arms that have just ejected the counter roll, moving rearward for readiness to eject a further roll, they at the same time and with the same motion inject a rewind shaft between the winding rolls. The combination of the ejecting and injecting is therefore an important object of this invention. To accomplish these two purposes most simply and with a minimum of apparatus is a further important object of the invention.

Although ejecting mechanisms have heretofore been used, the counter rolls at times vary in size and the mechanism of the present invention is designed to allow for such variation without affecting its efficiency. It has been found, however, that the ejecting arms or other mechanism approach the counter roll or its internally

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carried rewind shaft with such vigor in starting the movement of that roll from between the rewinding rolls that they frequently move the counter roll with excess force, sometimes ejecting it and sometimes moving it beyond the desired location. Another most important object of the present invention is to regulate the movement of these ejecting arms before the actual ejecting operation is begun so that they follow the rewind shaft on which they act, as that shaft moves upwardly with the increase in the size of the roll surrounding it. By the apparatus of this invention these ejecting arms are substantially always maintained at a very small distance from this rewind shaft, so that when they actually have power applied to them, to eject the web roll, they are nearly in contact with the rewind shaft so that their initial impact with that shaft is substantially negligible and the web roll moves forward therefore under the slow and controlled action of the ejecting arms, rather than being thrown or struck vigorously. Therefore, the size of the counter roll which is wound does not enter into or change the speed of the removal of the counter roll from between the winding rolls.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings forming a part hereof and in which:

Figure 1 is a partial end elevation of a rewind machine employing the features of the present invention.

Figure 2 is an enlarged view of the winding rolls with the injecting and ejecting elements shown positioned after the injection of a winding shaft to the valley between the winding rolls.

Figure 3 is an end elevation of the beginning of the ejecting operation.

Figure 4 is an end elevation showing the elements just after beginning the injecting operation.

Figure 5 is a fragmentary top plan view of the left end of the winding rolls and their bearings with the ejecting and injecting arms of the instant invention.

Figure 6 is a front fragmentary elevational view of the left end of the winding machine showing the elements of the instant invention.

In the drawings similar numerals refer to similar parts throughout the several views.

Although the drawings show only the left side of a winding machine involving the instant invention, it will be understood that the parts of the machine are duplicated on the right side unless otherwise stated.

The side frame 1 of the winding machine has thereon bearings 2 and 3 for the front winding roll 4 and the rear winding roll 5 respectively. The score slitting roll 6 is also illustrated. A rewind shaft 7 is placed in the valley between the winding rolls 4 and 5 and there engaged by a clamp 8 mounted on the front of carriage 9 riding on uprights 10 at each side of the rewinding machine.

As shown in the above described application on the Counter Roll Stripper, a framework 11 mounted in the front of the rewind machine receives and supports the counter rolls upon their delivery from the rewind machine. Reference may be had to the designated application for the details of the construction of this counter roll stripper. The stripper has projecting from its rear a ready trough 12 which receives the rewind shafts from the stripper and from which trough the apparatus of the instant invention moves the shafts to the valley between the winding rolls. Front winding roll 4 has a hub 13 around which is placed an annulus 14 with respect to which the hub rotates freely in the rotation of the winding roll 4. The annulus 14 has a gear 15 on its outer surface by which it is rotated. It has a ring 16 on its inner surface and to this ring 16 is bolted the ejector arm 17, the arm comprising two plates 18 and 19 which are bolted to each side of the ring 16. Only in the left end of the machine the ejector arm 17

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has at its end an extension 20 on the extreme outer side face of which is placed a follower 21 which rides on a cam 22 pivoted to the inside of carriage 9 at 23. This cam is supported, spaced from this pivot, by a rod 24 pivoted thereto at 25, the other end of which is affixed to the inside of the carriage 9 by bracket 26 and the rod 24 has thereover a nut 27 and therearound a spring 28 bearing between the bracket 26 and the lower end of rod 24 to hold the cam 22 resiliently and adjustably downwardly.

By means of segment gears 29 at each end of the machine the two gears 15 are rotated, the left segment gear 29 is pivoted at 30 in the base of the machine and the synchronizing shaft 31 is likewise affixed to the base of the machine in a rotatable position in bearings 32. This synchronizing shaft 31 has forks 33 projecting upwardly from each end which engage rollers 34 fixed in each segment gear 29 to coordinate the movements of the segment gears at each side of the machine, so that a follower 21 and cam 22 is only required at one side of the machine to assure movement in unison of the ejector arms 17 at each end of the machine.

Each ejector arm 17 has pivoted substantially between its ends, and between its plates, a forwardly directed angular injector arm 35. Each arm has at its free ends a hooked portion 36 and they swing from the ejector arms, when these arms are upright, in the form of a carriage for the rewind shaft. The ready trough 12 is sectioned vertically so as to allow free access to the carried rewind shaft for the injector arms 35. Each injector arm has thereon and projecting substantially outwardly therefrom a follower 37 which rides on a guide 38 which is pivoted at 39 in a bracket 40 attached to the top inner edge of the bearing housing 2. Guide 38 is supported at its free end on rod 41 held at its lower end in bracket 42 attached to the side frame 1 of the rewind machine. A spring 43 holds the rod 41 extended under pressure of the spring and a collar 43' limit upward movement of the rod.

The guide 38 is initially pushed up by the spring, to allow the entrance of the pointed forward end of the injector arm hook 36 under a rewind shaft and because of the pointing of the end on that hook the guide 38 is pressed downwardly against its springs until the hook of the injector arm passes under the rewind shaft, at which time the guide is extended upwardly by its spring so that the injector arm engages the rewind shaft and rearward movement of both the arms will then remove the shaft over the sloping rear edge 44 of the ready trough 12. The guides 38 acting on the followers 37 continue to guide the injector arms 35 as they are moved rearwardly by the ejector arms 17, in their rearward movement until the rewind shaft 7 has passed the crown on forward rewind roll 4. Way 44' on framework 11 fits between the ends of the spool head of rewind shaft 7 when the rewind shaft is in the ready trough 12, as shown in Figure 1, and guides that shaft axially, as it is pulled over the crown of roll 4, where it is released from the way, as shown in Figure 5.

The ejector arms likewise each have an angular portion as shown at 45 which rotates concentrically with the forward winding roll 4 and these angular portions of the ejector arms then receive the rolling rewind shaft and with continued counter-clockwise rotation of the ejector arms the shaft is lowered into the valley between the two winding rolls as shown in Figure 2. When the followers 37 leave the guides 38 the injector arms ride upon the circumference of the rings 16 as shown in Figures 1 and 2. This maintains the inner angular portions of the injector and ejector arms substantially together as shown in Figure 2 but as is also clearly shown in this figure, the injector arm has moved considerably below the rewind shaft.

The segments 29 are held under constant relatively weak spring pressure backward as shown in Figure 1 by means of springs 46 mounted on rods 47 pivoted to seg-

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ment gears 29 as at 48 and pivoted to plates 49 by means of trunnions 50. The pressure of these springs 46 is just sufficient to maintain follower 21 in contact with cam 22 and the shape of this cam is such as to permit the ejector arms to rise with the rise of the clamps 8 as the web roll increases in radius as the web is wound upon the rewind shaft. The segments 29 are moved by fluid pressure pistons attached thereto and acting in cylinders 51 likewise trunnioned at 52 in plates 49 attached to supporting beams 53 on the sides of the frame 1. Pressure may be admitted to either end of cylinders 51 to move the ejector arms either backward or forward. Should they be moved forward while the follower 21 is still within the cam 22, the cam will yield under its spring 28 and release the follower.

When the rewind shafts have been placed in the valley between the winding rolls the clamps 8 in the carriages 9 are lowered around the ends of the shaft, surrounding the spool like end, on the shaft left end, to retain the shaft from longitudinal movement with respect to the clamps, and the shaft is then held in the clamps by inserting pins 54 within holes in the front and back sides of the clamp. The winding then proceeds as described in the first above mentioned application and after the completion of the desired size of the counter roll the machine is stopped and since the ejector arms have been maintained in proximity to the rewind shaft under action of springs 46, as restrained and guided by cam 22, pressure in the ejecting side of cylinder 51 will move the ejector arms against the rewind shaft as shown in solid lines in Figure 3. The ejector arms then move forward as shown in dotted lines in this figure at which time the web roll has moved to the position shown on the web roll support or counter roll stripper and during this movement the injector arms have moved forward under a rewind shaft in the ready trough as likewise shown in dotted lines in this figure. The direction of movement of the ejector arms is then reversed as shown in Figure 4, pulling the rewind shaft from the ready trough up and over the crown of the front winding roll and after it passes this crown the shaft is restrained in its downward movement around the winding roll by the ejector arm cradle until the rewind shaft reaches the valley between the two rewind rolls, the ejector arms being dotted in Figure 4 in this position.

When it is desired to use the rewinding machine to wind larger rolls, this counter roll ejector is locked out of operation by placing pin 55 in opening 56 in left rod 47, which locks the rods from movement under the action of their springs 46, and therefore, follower 21 does not follow cam 22 in its upward movement.

It will be apparent that a very simple, effective and rugged injector and ejector have been described above and that many changes may be made in the construction without departing from the invention.

What is claimed as new and is desired to be secured by Letters Patent is:

1. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon, the improvement comprising an ejector arm beneath the rewind shaft at each end during winding of the web roll thereon the arms being pivoted adjacent each end of the front winding roll and adapted to contact the rewind shaft and roll a web roll from the valley and over the front roll, tension means to urge said arms up to proximity to the rewind shaft and movable guide means for the arms restraining said tension means, to maintain the proximity of the arms to the shaft substantially constant during the winding of a web roll on the shaft.

2. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon and a web roll sup-

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port forward from the front roll, the improvement comprising an ejector arm beneath the rewind shaft at each end during winding of the web roll thereon the arms being pivoted substantially axially of and at each end of the front winding roll and adapted to roll a web roll over the front winding roll from the valley to the support, tension means to urge said arms up to proximity to the rewind shaft and movable guide means for the arms restraining said tension means, to maintain the proximity of the arms to the shaft substantially constant during the winding of a web roll on the shaft.

3. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon, the improvement comprising a substantially vertically movable cam, movable in unison with the increase in roll radius during winding, an ejector arm beneath the rewind shaft at each end during winding of the web roll thereon the arms being pivoted adjacent each end of the front winding roll in proximity to and adapted to contact a web roll rewind shaft and move the web roll from the valley and over the front roll, means to coordinate the movements of said arms together, a follower on one of said arms and means to move said arms up to maintain said follower in contact with said cam, whereby said arms follow in proximity to the rewind shaft upon winding a roll thereon.

4. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon, the improvement comprising a lowering arm pivoted adjacent each end of the front winding roll, the lowering arms having rewind shaft holding surfaces to hold a rewind shaft centrally of the valley between the winding rolls when the rewind shaft is lowered into said valley, a hooked injector arm pivoted on each lowering arm, a rewind shaft ready trough forward of the front winding roll, means to engage the hooked injector arms under a rewind shaft in the ready trough cooperating with the lowering arms to move the shaft from the trough to the valley under the constant control of said arms, the hooked injector arms having rewind shaft holding surfaces cooperating with those of the lowering arms as the rewind shaft is lowered to said valley.

5. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon, the improvement comprising a rewind shaft ready trough forward of the front winding roll, a lowering arm pivoted adjacent each end of the front winding roll and swinging through an arc including an upright position, the lowering arms having rewind shaft holding surfaces to hold a rewind shaft centrally of the valley between the winding rolls when the rewind shaft is lowered into said valley, a forwardly directed hooked injector arm pivotally depending from each lowering arm when upright, guide means to guide the injector arms under a rewind shaft in the ready trough to engage the rewind shaft upon forward movement of the lowering arms and means to move the lowering arms forwardly to engage a rewind shaft, and rearwardly to lower the rewind shaft in the valley under the constant control of said arms, the hooked injector arms having rewind shaft holding surfaces cooperating with those of the lowering arms as the rewind shaft is lowered to said valley.

6. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon, the improvement comprising an ejector arm pivoted adjacent each end of the front winding roll adapted to move a web roll from the valley and over the front roll, an injector arm pivoted on each ejector arm, a rewind shaft ready trough for-

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ward of the front winding roll and a web roll support forward of the ready trough, means cooperating with the ejector arms to automatically engage the injector arms with a rewind shaft in the ready trough to move the rewind shaft from the ready trough to the valley, the ejector arms having rewind shaft holding surfaces to hold a rewind shaft centrally of the valley between the winding rolls when the rewind shaft is being lowered into said valley, under the constant control of said arms, the injector arms having rewind shaft holding surfaces cooperating with those of the ejector arms as the rewind shaft is being lowered to said valley, the ejector arms then being positioned upon reverse movement, to move a web roll from the valley to the roll support and means to impart said movements to the ejector arms.

7. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon, the improvement comprising upwardly directed hooked injector arms pivoted adjacent the ends of the front winding roll, a rewind shaft ready trough forward of said front winding roll, means to move said arms under a rewind shaft in said trough and upon reverse movement, to transfer the shaft to the valley between the winding rolls for support by the winding rolls free of the arms and means, said rewind shaft being under the constant control of said means until supported by the rolls.

8. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon, the improvement comprising upwardly directed hooked injector arms pivoted adjacent the ends of the front winding roll, a rewind shaft ready trough forward of said front winding roll, yieldable injector arm guide means extending from the front winding roll to the trough, and means to move said arms over said guide means and under a rewind shaft in said trough and to transfer the rewind shaft to the valley between the winding rolls under the constant control of said arms and arm moving means.

9. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon, the improvement comprising an ejector arm pivoted adjacent each end of the front winding roll adapted to move a web roll from the valley and over the front roll, and swinging through an arc including an upright position, a forwardly directed hooked injector arm pivotally depending from each ejector arm when upright, a rewind shaft ready trough forward of the front winding roll, guide means to guide the injector arms into automatic engaging position with a rewind shaft in the ready trough upon forward movement of the ejector arms, and means to move the ejector arms forward to automatically engage a rewind shaft and then rearwardly to lower the rewind shaft in the valley under the constant control of said arms.

10. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon, the improvement comprising a substantially vertically movable cam, movable in unison with the increase in roll radius during winding, an ejector arm beneath the rewind shaft at each end during winding of the web roll thereon the arms being pivoted adjacent each end of the front winding roll in proximity to and adapted to contact a web roll rewind shaft and move the web roll from the valley and over the front roll, and swinging through an arc including an upright position, means to coordinate the movements of said arms together, a follower on one of said arms and means to maintain said follower in contact with said cam, a forwardly directed hooked injector arm pivotally depending from each ejector arm when upright, a re-

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wind shaft ready trough forward of the front winding roll, guide means to guide the injector arms into engaging position with a rewind shaft in the ready trough upon forward movement of the ejector arms, and means to move the ejector arms forward to eject a web roll from the winding rolls and to engage a rewind shaft and then rearwardly to lower the rewind shaft in the valley.

11. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon, the improvement comprising an ejector arm beneath the rewind shaft at each end during winding of the web roll thereon the arms being pivoted substantially axially of and at each end of the front winding roll, and swinging through an arc including an upright position, a rewind shaft ready trough forward of the front winding roll, a forwardly directed hooked injector arm pivotally depending from each ejector arm when upright, means to guide the injector arms into automatic engagement with a rewind shaft in the ready trough upon forward movement of the ejector arms, means to swing the ejector arms to eject a web roll from the valley over the front winding roll and ready trough and on the same swing, to automatically engage a rewind shaft in the ready trough and to reversely swing the ejector arms to lower the engaged rewind shaft in the valley.

12. The winding machine of claim 11 including a substantially vertically movable cam, movable in unison with the increase in roll radius during winding, the ejector arms being in proximity to the rewind shaft in winding a web roll thereon, means to coordinate the movements of said ejector arms together, a follower on one of said ejector arms and means to maintain said follower in contact with said cam to space the ejector arms closely adjacent the rewind shaft.

13. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon, the improvement comprising an ejector arm pivoted coaxially with and at each end of the front winding roll and swinging through an arc including an upright position, a forwardly directed arcuate hooked injector arm pivotally depending from

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each ejector arm when upright, a rewind shaft ready trough forward of the front winding roll, means to guide the injector arms into engagement with a rewind shaft in the ready trough upon forward movement of the ejector arms, said injector arms and guide means including means to lower the injector arms beneath a rewind shaft and raise the injector arms to rewind shaft removal engagement, and means to swing the ejecting arms forward to engage a rewind shaft with the injector arms and rearwardly to swing the injector arms carrying the shaft over the front winding roll, the ejecting arms tilting the pivoted end of the injector arms in rearward movement to release the rewind shaft from the injector arms after passing the crown of the front winding roll.

14. A winding machine having front and rear surface winding rolls spaced apart and rotatable in the same direction to receive in the valley between them a rewind shaft and wind a web roll thereon, the improvement comprising unitary arcuate ejector arms coaxially mounted with the front winding roll at each end, said arms having an arcuate portion adapted to cradle a rewind shaft in the arcs of the two arms when lowering a shaft between the winding rolls, and when removing a web roll therefrom and swinging through an arc including an upright position, a forwardly directed hooked injector arm pivotally depending from each ejector arm when upright, a rewind shaft ready trough forward of the front winding roll, means to guide the injector arms into engagement with a shaft in the ready trough upon forward movement of the ejector arms, and means to swing the ejector arms forward to engage a shaft with the injector arms and rearwardly to swing the injector arms carrying the rewind shaft over the front winding roll, the ejecting arms tilting the pivoted end of the injector arms in rearward movement to release the rewind shaft after passing the crown of the front winding roll from the injector arms to roll to the two rearwardly moving ejector arms.

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