No. 618,125. Patented Jan. 24, 1899.

T. M. NORTH.

TYMPAN SHIFTING MECHANISM.

(Application filed Oct. 13, 1897.)

(No Model.) 6 Sheets—Sheet 1.

Fig. 1.

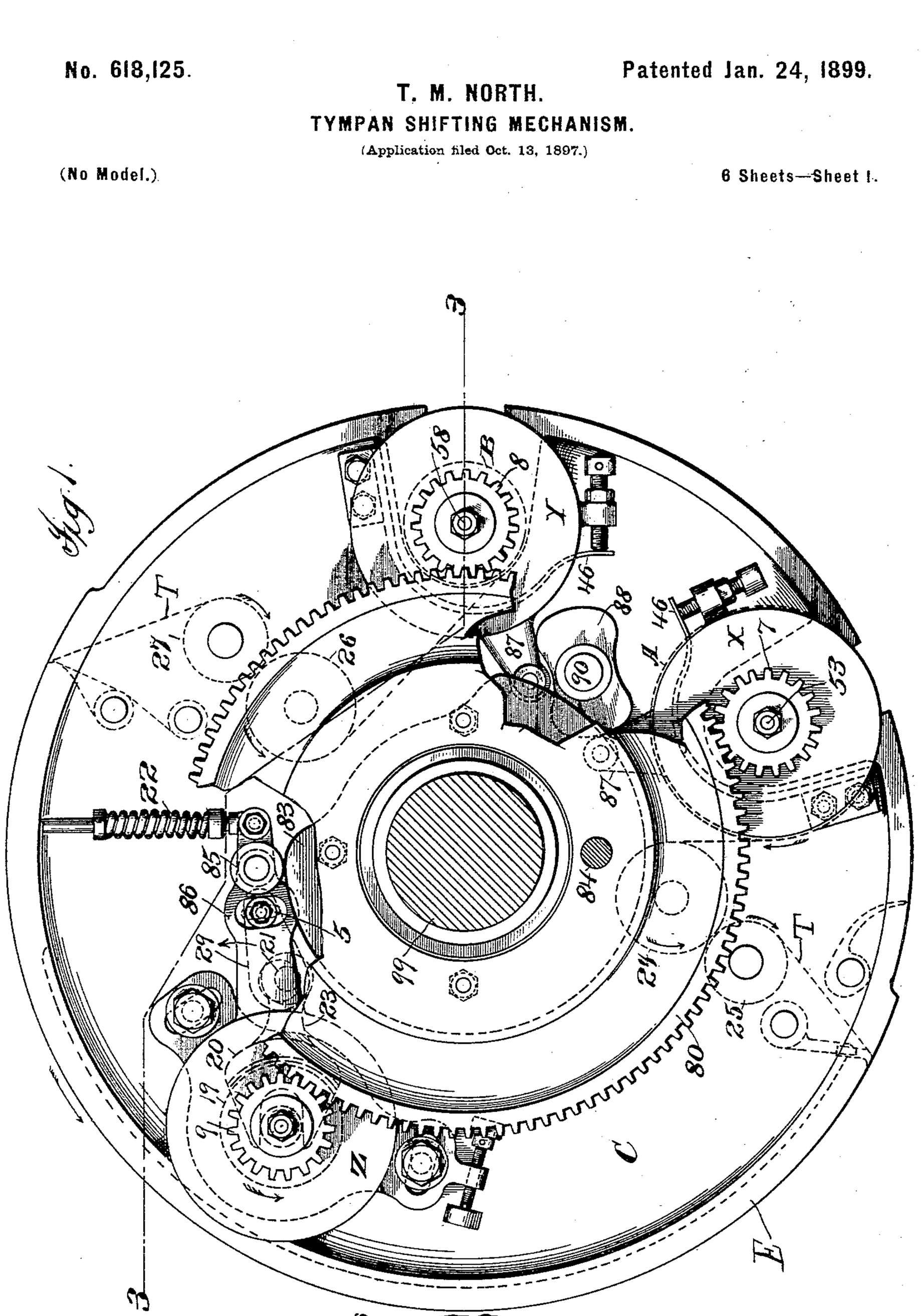

Fig. 4.

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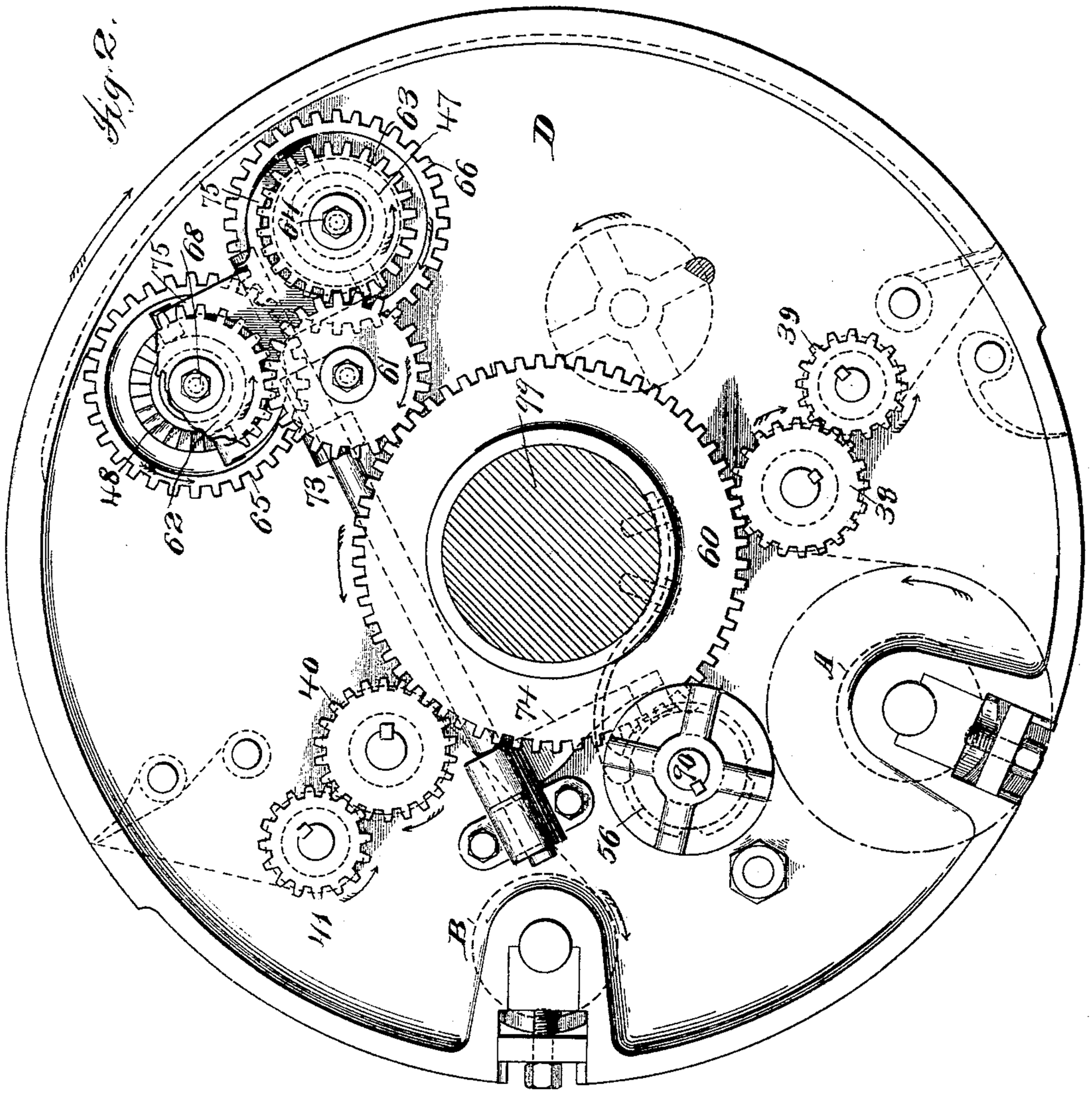
(No Model.) 6 Sheets—Sheet 2.

Fig. 2.



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(No Model.) 6 Sheets—Sheet 3.

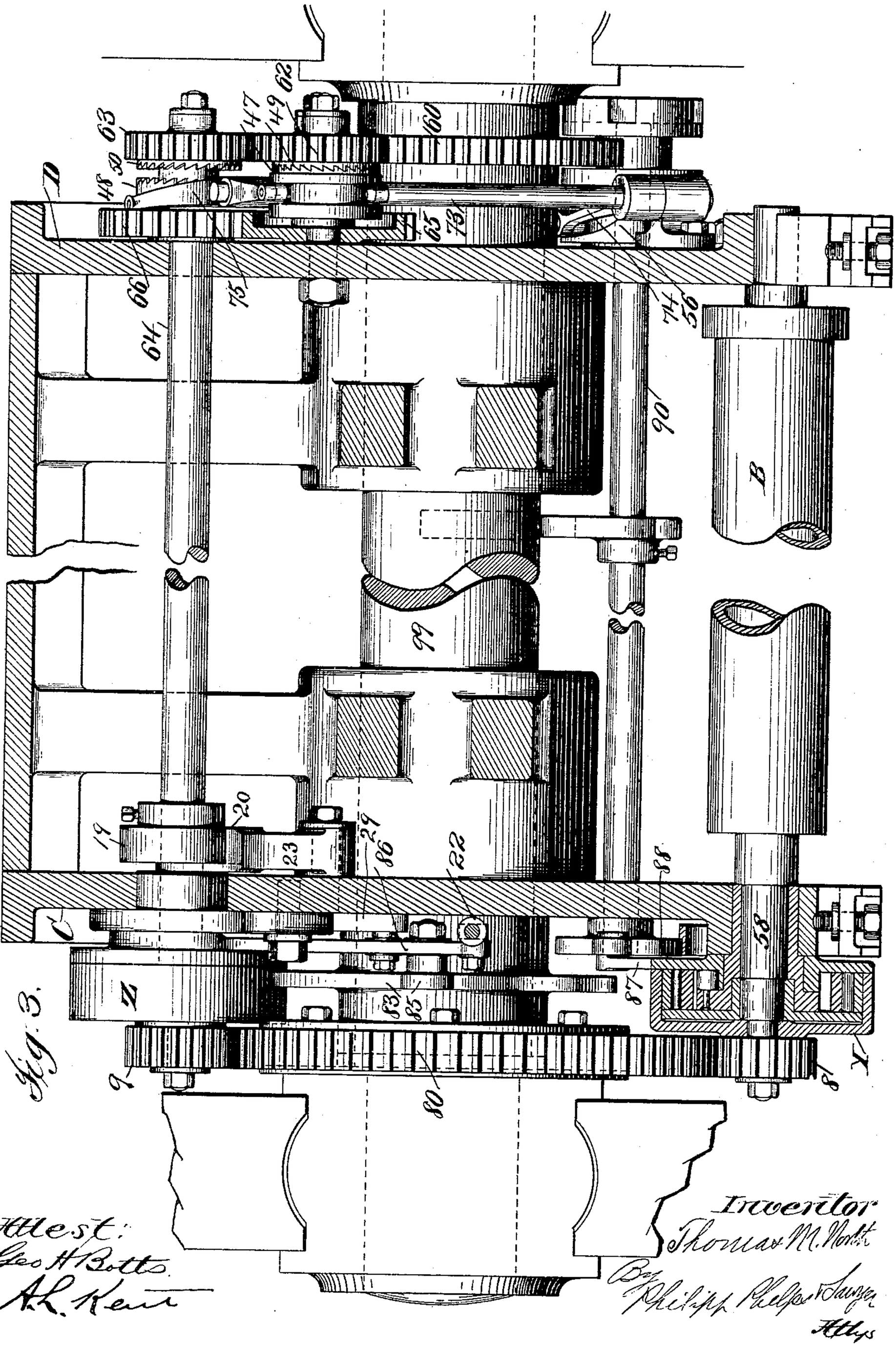

Fig. 3.

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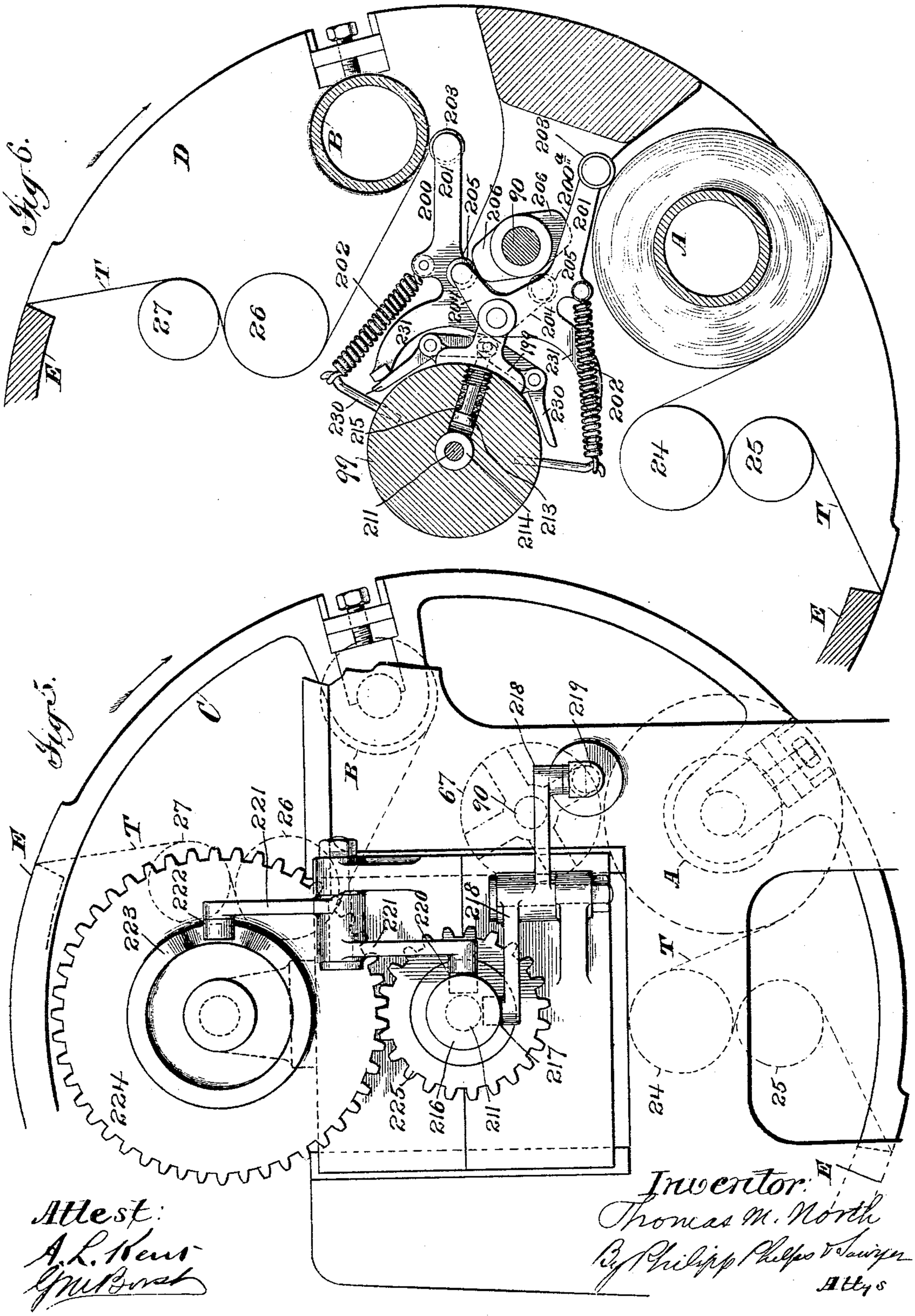
TYMPAN SHIFTING MECHANISM.

(Application filed Oct. 13, 1897.)

(No Model.) 6 Sheets—Sheet 4



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(Application filed Oct. 13, 1897.)

(No Model.) 6 Sheets—Sheet 5.

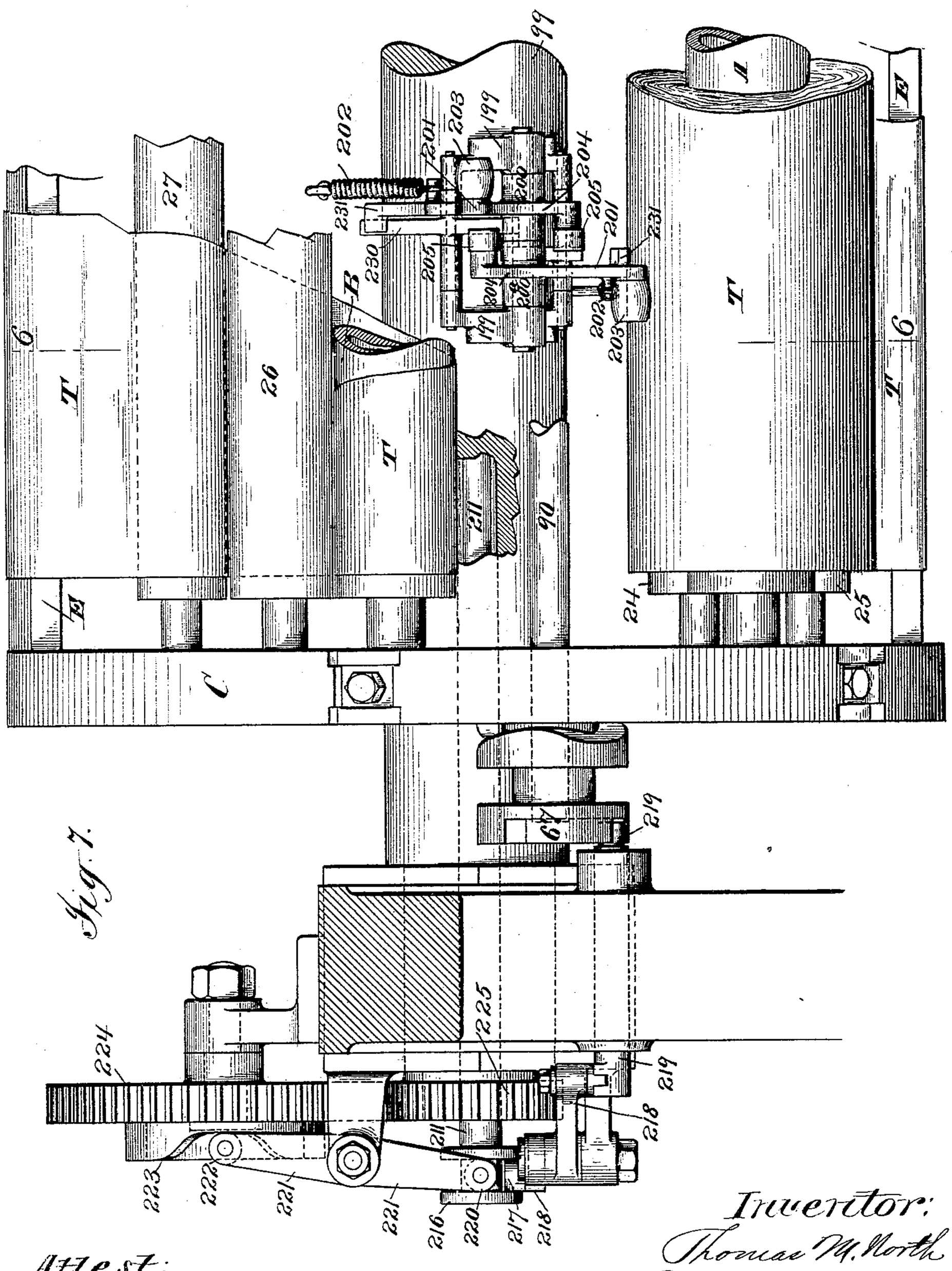

Fig. 1.

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(Application filed Oct. 13, 1897.)

(No Model.) 6 Sheets—Sheet 6.

Fig. 9.

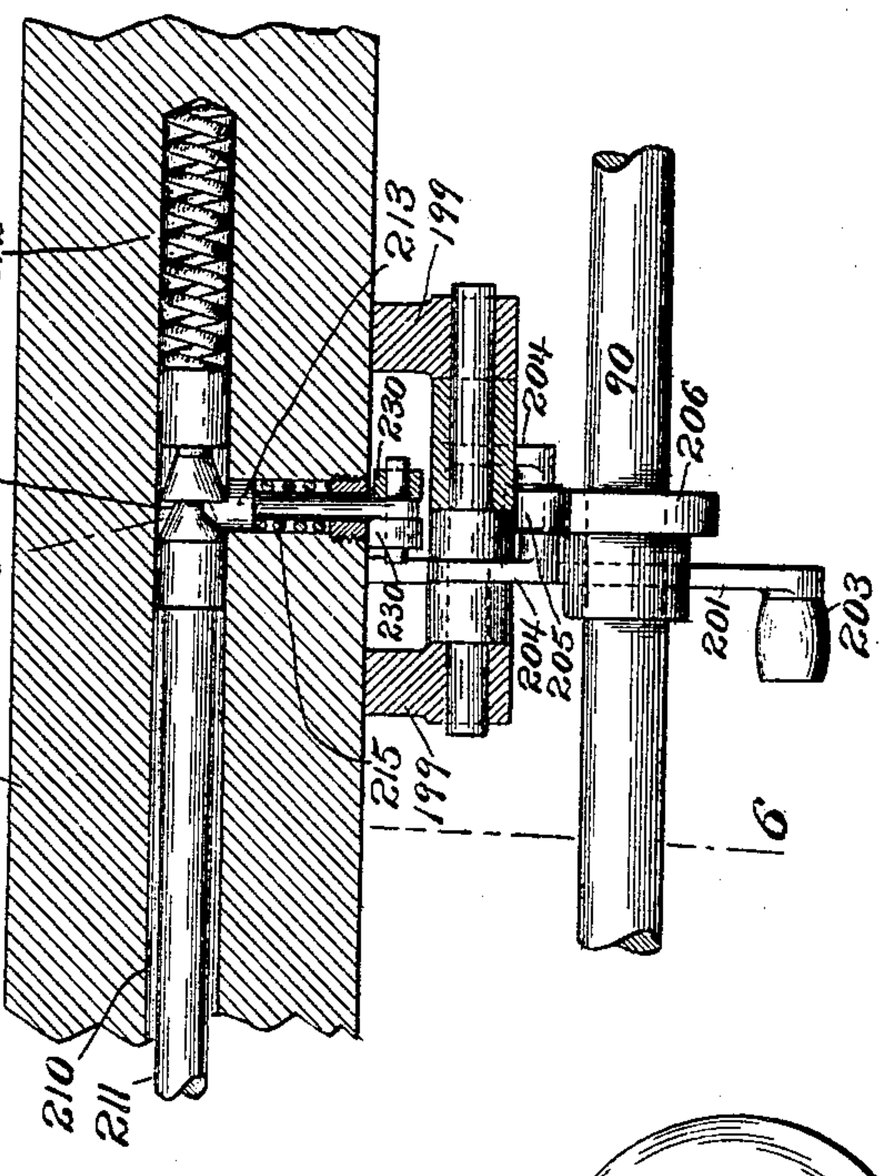
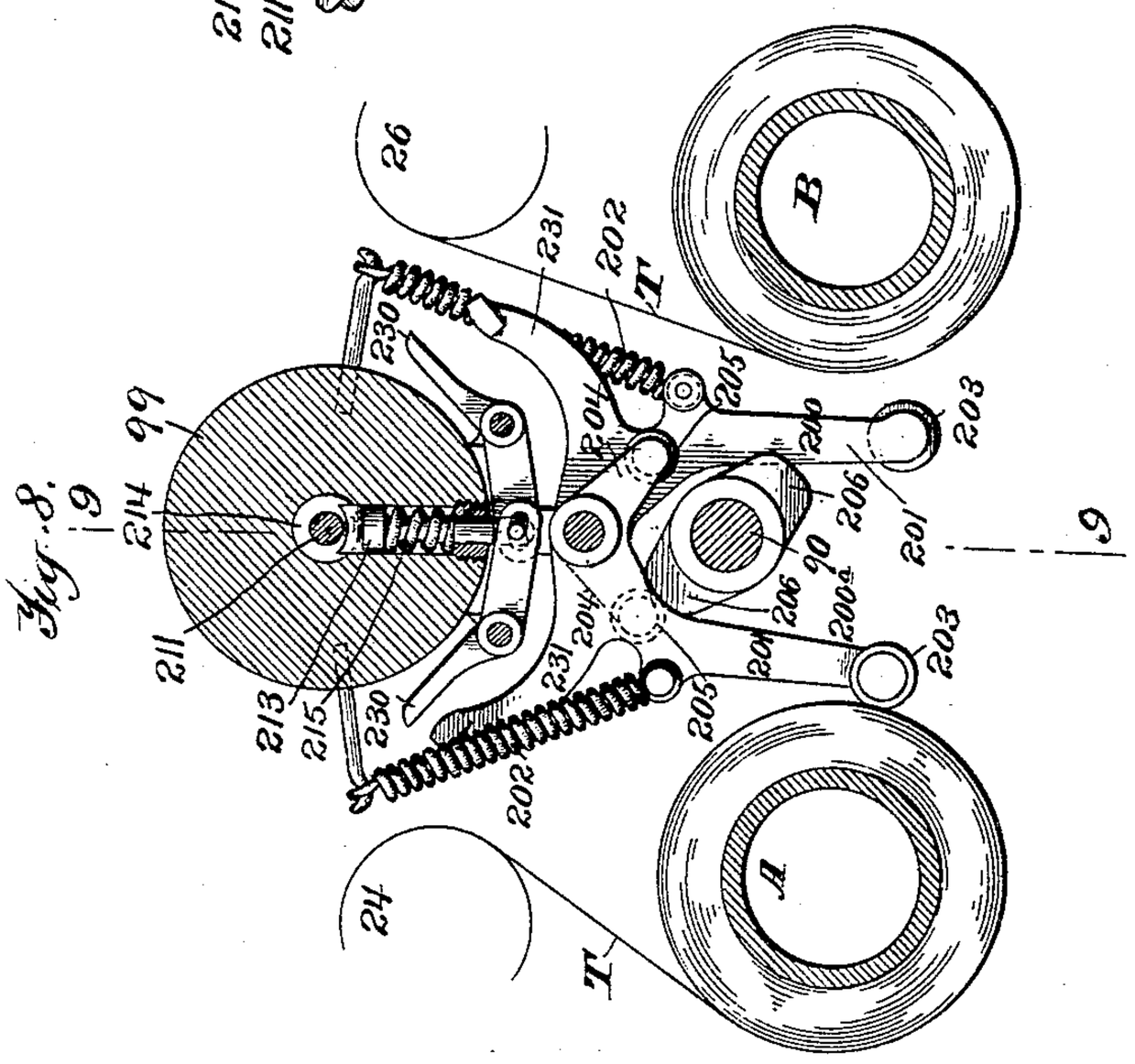


Fig. 8.



Attest:
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UNITED STATES PATENT OFFICE.

THOMAS M. NORTH, OF NEW YORK, N. Y., ASSIGNOR TO ROBERT HOE, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF SAME PLACE.

TYMPAN-SHIFTING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 618,125, dated January 24, 1899.

Application filed October 13, 1897. Serial No. 655,028. (No model.)

To all whom it may concern:

Be it known that I, THOMAS M. NORTH, a subject of the Queen of Great Britain, residing at New York, (Brooklyn,) county of Kings, and State of New York, have invented certain new and useful Improvements in Tympan-Shifting Mechanisms, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates especially to mechanisms by which a tympan in the form of a long web stretched from one roller to another within an impression-cylinder of a printing-machine and passing intermediately over the impression or printing surface of the cylinder is moved over that surface, so as to present successive clean surfaces for contact with the printed side of a once-printed sheet during its perfecting or second printing, and by which the tympan, having been repeatedly shifted in one direction, may by the reversal of its actuating mechanism be repeatedly shifted in the contrary direction, the means for reversing preferably being automatic in operation.

More particularly, the invention relates to means for determining the extent of movement of the tympan in one direction and for controlling the operation of the reversing mechanism, by which the direction of movement of the tympan is automatically changed.

This invention is intended especially to provide an improved means for controlling the automatic reversing of a tympan-shifting mechanism such as is shown in the application of L. C. Crowell and Thomas M. North, Serial No. 627,778, filed March 16, 1897, although it is to be understood that the invention may be employed in connection with other mechanisms to which it may be found applicable. According to the present invention the operation of an automatic reversing mechanism is governed by the size of one of the rolls of tympan and preferably by the size of the delivering-roll or the roll from which the tympan is being unwound. The time of the change of direction of the movement of the tympan being thus determined by the size of one of the rolls of tympan, and especially when determined by the size of the delivering-roll, all danger of the movement of the tympan in one direction being continued too long is avoided, the tympan may be used almost to the end before reversal, and tympans of different lengths may be employed equally well, whereas with reversing mechanisms in which the reversing is made at the end of a predetermined number of shifting movements the tympan must be of a length at least sufficient to permit that number of movements before reversing, and, moreover, the tympan is liable to be taken up a trifle more when it is moved in one direction than when it is moved in the other, which might result after repeated reversals in the drawing of the tympan entirely off from one of the rolls before the time for reversing, so that it is desirable in such constructions to allow a considerable surplus of length of tympan in view of this possible gradual movement of the tympan toward one of the rolls.

It will be seen also that the invention provides an efficient means for preventing the tympan being drawn entirely off the tympan-rollers by controlling the extent of feed of the tympan in one direction by the size of one of the rolls of tympan whether in connection with means for automatically reversing the direction of the movement of the tympan or not, and this feature forms a part of the invention, which is not limited to the controlling of automatic reversing mechanism.

As a full understanding of the invention can best be given by a detailed description of a construction embodying all the features of the same in their preferred form, such a description will now be given in connection with the accompanying drawings, showing such a preferred construction, and the features forming the invention will afterward be specifically pointed out in the claims.

In said drawings, Figure 1 is an end elevation of an impression-cylinder of a printing-machine provided with a tympan-shifting mechanism constructed as shown in the said application of Luther C. Crowell and Thomas M. North, Serial No. 627,778, the view being taken just within the frame of the machine and looking to the left in Fig. 3. Fig. 2 is an elevation of the opposite end of the cylinder, taken just within the frame of the machine.

Fig. 3 is a sectional plan view of the cylinder shown in Figs. 1 and 2, taken on the section-line 3 of Fig. 1. Fig. 4 is a detail showing the sliding cam-disk for controlling the clutch through which the tympan-shifting devices are set in motion at the proper intervals. Fig. 5 is an end view of the impression-cylinder and a part of its supporting-framework provided with a reversing mechanism embodying the present invention, the tympan-shifting mechanism shown in Figs. 1, 2, and 3 being indicated by dotted lines. Fig. 6 is a section on line 6 of Figs. 7 and 9. Fig. 7 is a broken side view of the cylinder and reversing mechanism, taken from the right of Fig. 5. Fig. 8 is a detail sectional view taken on line 6 of Figs. 7 and 9, but showing the parts in a different position from that shown in Fig. 5. Fig. 9 is a detail view taken on line 9 of Fig. 8.

Referring to the drawings, the impression-cylinder is shown as mounted upon a shaft 99, having bearings in the side frames, and consists of two heads C and D and an intermediate shell or curved bearing-plate, which forms an impression-surface E, over which the tympan T is stretched and over which it moves. Within this cylinder and mounted to rotate in the heads thereof are two tympan-carrying rollers A and B, about which the tympan is wound and between which it extends over the impression-surface E, each of said rollers acting at times as a winding-up or receiving roller and as a paying-out or delivering roller. In passing between the roller A and the impression-surface E the tympan passes around and between a set of measuring or feeding rollers 24 and 25, and in passing between the rollers B and the impression-surface of the cylinder the tympan passes around and between a set of measuring or feeding rollers 26 27.

The shafts 53 and 58 of the tympan-carrying rollers A and B carry at one end loose pinions 7 and 8, respectively, which pinions mesh with a stationary circular rack 80. These pinions 7 and 8 are respectively fast to the loose members of friction-clutches X and Y, the fast members of which clutches are carried by the shafts 53 and 58 of the rollers A and B, respectively. As the cylinder rotates forwardly or in the direction of the arrow shown in Fig. 1 the pinions 7 and 8 will be rotated by engagement with the stationary circular rack 80 and will tend to drive their respective rollers A and B when the clutches X and Y are in action. The operation of the clutches is controlled by a reversing-cam 88 on a shaft 90, acting on clutch-levers 87 87. The clutches may be of any suitable construction, but preferably of the construction shown in said Crowell and North application, and, as shown, are put into operation by springs 46 46 when the levers 87 87 are opposite low parts of the cam 88 and are put out of operation when the levers 87 87 are moved by the high parts of the cam. The cam 88 is formed so that when one of the clutches X Y is put into operation the other will be out of operation and the corresponding shaft and tympan-roll free to rotate. The shaft 90 is rotated in the construction shown a quarter-rotation when the direction of movement of the tympan is to be reversed.

The shafts of the measuring or feeding rolls 24 25 and 26 27 are journaled in the cylinder-heads C D and project beyond the cylinder-head D intermeshing gears 38 39 and 40 41, respectively, through which they are driven in unison through a gear 60, which meshes with the pinions 38 and 40 and which is rotatably mounted on the cylinder-shaft 99. This gear 60 is driven through an intermediate 61, which meshes with gears 62 and 63, through one or the other of which gears 62 or 63 it is driven to cause the gear 60 and the measuring or feeding rolls to rotate in one direction or the other, according to the direction in which the tympan is to be shifted. The gear 62 rotates freely on a stud 68, extending from the cylinder-head D, and the gear 63 rotates freely on the projecting end of a shaft 64, journaled in the cylinder-heads. The shaft 64 also carries a gear 66, which is fast on the shaft and which meshes with a gear 65, loose on the stud 68, which gears 66 and 65 are of the same size. Each of the gears 66 and 65 carries a sliding clutch member 48 and 47, respectively, to coact with fast clutch members 50 and 49, carried by the loose gears 63 and 62, respectively. The movement of the sliding clutch members 47 and 48 is controlled by a rock-shaft 73 through a two-armed lever 75, the arms of which are provided with toes which enter peripheral slots in the sliding clutch members, so that as the shaft 73 is rocked in one direction or the other one of the clutches will be thrown into couple and the other simultaneously uncoupled. The shaft 73 is rocked alternately in opposite directions at the proper intervals corresponding to the change of direction of the shifting of the tympan by means of a cam-drum 56 on the reversing-shaft 90 through an arm 74, carried by the shaft 73 and having a bowl extending into the slot of the cam 56. The shaft 64 carries outside the cylinder-head C a loose pinion 9, that meshes with and is driven by the circular rack 80 and by which the shaft 64 is driven through a friction-clutch Z, one member of which clutch is carried by and rotates with the pinion and the other member of which is fast to the shaft 64. The clutch Z is thrown into action for driving the feeding-rollers 24 25 and 26 27 by means of a clutch-lever 86, which is moved in the direction of the arrow shown in Fig. 1 against the tension of the spring 22 for throwing the clutch into action by means of a cam-disk 83, which engages a roll 85 on the clutch-lever 86.

It is usual in machines of this class to have the impression-cylinder make two revolutions

for each impression. In order, therefore, that the tympan shall be shifted not more than once for each two revolutions of the impression-cylinder, the cam 83 is mounted so as to be moved into and out of position to engage the roll 85 on the clutch-lever 86. The means for securing this result in the construction shown are illustrated in the detail view Fig. 4, the cam-disk 83 being carried by a collar mounted to slide on the cylinder-shaft 99 and held against rotation with the cylinder-shaft and slid longitudinally thereon to carry the cam-disk into and out of operative position by means of a sliding pin 84, the movement of which pin is controlled by a wing-cam 28, pivoted to the frame to move through the slotted end of the sliding pin 84 and which may be operated from any moving part of the machine to cause the movement of the cam 83 at the desired intervals. When the clutch-lever 86 is moved by the spring 22 to throw the clutch Z out of operation, the rotation of the shaft 64, and consequently of the feeding-rolls 24 25 and 26 27, is stopped by means of a brake-shoe 20, acting on a brake-wheel 19, carried by the shaft 64 just within the cylinder-head C, the brake-shoe 20 being carried by an arm 23, which is hung on an eccentric-pin 21, journaled in the cylinder-head C and rocked to move the brake-shoe to and from the brake-wheel 19 by a rock-arm 29, which is actuated by a driving-stud 5, projecting from the lever 86. The clutch Z may be of any suitable construction, as, preferably, of the construction shown in said Crowell and North application.

The movement of the feeding-rolls 24 25 and 26 27 through the operation of the clutch Z as controlled and determined by the cam 83 causes the tympan to be moved or shifted over the impression-surface of the cylinder at the desired intervals, as at each second revolution of the cylinder, and to be transferred by such successive movements from one of the tympan-rollers A B to the other.

With the reversing-shaft 90 and its cams 88 and 56 in the position shown in Figs. 1 and 3 the clutch X will be held out of action by a high part of the cam 88 bearing on the clutch-lever 87, thus leaving the tympan-roller A free to turn to allow the tympan to be unwound therefrom, and the clutch-lever 87 of the clutch Y will be released by the cam 88 to permit the clutch Y to be thrown into action by the pressure of its springs 46 to drive the tympan-roll B whenever the tympan is fed or shifted by the feeding-rolls 24 25 and 26 27. As shown in these figures also, the shaft 73 is rocked by the cam 56, acting on the rock-arm 74, so as to drive the gear 60 from the gear 62, whereby the feeding-rolls 24 25 and 26 27 will be driven, when the clutch Z is in operation, to feed the tympan from the roll A to the roll B. With the parts in this position, therefore, the tympan will be fed at intervals determined by the throwing of the clutch-lever 86 of the clutch Z by the cam 83 from the tympan-roll A, then acting as the let-off roll, to the tympan-roll B, then acting as the wind-up roll. The successive shifting movements of the tympan in this direction will continue until the shaft 90 is given a quarter-rotation, whereby the reversing-cam 88 will be moved to move the clutch-lever 87 to throw the clutch Y out of operation and to release the clutch-lever 87 of the clutch X to permit the spring 46 to throw this clutch into operation, and whereby the cam 56 will be moved to rock the shaft 73 to shift the sliding clutch members 47 and 48 to release the gear 62 and connect the gear 63, so as to cause the gear 60 to be driven from the gear 63 in the opposite direction to that in which it was before driven from the gear 62. By these movements the clutch X will have been thrown into operation to cause the tympan-roll A to operate as the wind-up roll, and the clutch Y will have been thrown out of operation to permit the tympan-roll B to become the let-off roll, and the feeding-rolls 24 25 and 26 27 will be driven, when the clutch Z is operating, in the opposite direction to that of their former movement—that is, so as to feed the tympan from the roll B to the roll A. The tympan will thus be fed at successive intervals over the impression-surface of the cylinder from the roll B to the roll A, and these movements in this direction will continue until the shaft 90 is again moved a quarter-turn to cause the feeding movement to be again reversed to feed the tympan from the roll A to the roll B.

The present invention consists partly of means whereby in the preferred application of the invention shown the reversing-shaft 90 is actuated and which will now be described.

Referring now especially to Figs. 5 to 9, pivoted to a bracket 199, carried by the cylinder-shaft 99, are two tripping-levers 200 and 200^a, each having an arm 201, the ends of which arms extend opposite the tympan-rollers A and B, respectively. These levers are under spring tension to move their arms 201 toward the tympan-rollers, as by coiled springs 202, the ends of the arms 201 being preferably provided with antifriction-rolls 203 to bear against the rolls of tympan on the tympan-rollers. Each of the levers 200 200^a has also an arm 204, which arms extend one toward either side of the reversing-shaft 90 and carry rolls 205 205, positioned to be engaged by a double-acting cam 206 on said shaft, whereby one or the other of the rolls 205 is engaged to hold one or the other of the arms 201 away from the tympan-roller A or B, the cam 206 being so formed that for each reversing movement of the shaft 90—that is, in the construction shown for each quarter-rotation of the shaft—one of the levers 200 200^a will be moved to carry its arm 201 away from and to hold it out of contact with the tympan and the other lever released and allowed to move under the action of its tension-

spring, so that its bearing-roll 203 will bear against the roll of tympan which is to be unwound.

Mounted in a hole 210, extending centrally of the cylinder-shaft 99, is a spindle 211, normally held in the position shown in Figs. 8 and 9 against the tension of a spring 212 by means of a catch or detent 213, engaging in a notch 214 in said spindle and spring-pressed, as by a spring 215, to hold it in engaging position. Beyond the end of the cylinder-shaft the spindle carries a spool 216, between the shoulders of which extends a stud or roll 217 on the end of a rocking lever 218, pivoted to a bracket on the journal-box of the cylinder-shaft, the other end of which lever engages a pin 219, extending through the supporting-frame of the machine in position so that its inner end may be moved into position to engage and actuate a tumbler-cam 67 on the shaft 90 as it moves with the cylinder. Also entering between the shoulders of the spool 216 is a roll 220, carried by one arm of a rocking lever 221, pivoted in a bracket on the journal-box of the cylinder-shaft, the other arm of which lever carries a roll 222, extending over an annular cam 223, by which the movement of the spindle outward from the end of the shaft is prevented except when the cam is in position with its depressed portion beneath the roll 222, as shown in Figs. 5 and 7, when the spindle is free to move outward to the position shown in Fig. 7 except as it is prevented from so doing by the detent 213. The cam 223 carries a gear 224, meshing with and driven by a gear 225 on the end of the cylinder-shaft 99. Pivotally connected to the outer end of the detent 213 are the ends of two tappet-levers 230 230, the outer ends of which extend into position to be engaged by arms 231 of the tripping-levers 200 200[a] to cause the detent to be withdrawn to release the spindle when the tympan has been almost all unwound from the tympan-roller, so as to permit a sufficient movement of the lever 200 or 200[a], as the case may be, under the action of its tension-spring.

During the shifting of the tympan in either direction the spindle 211 is normally held retracted against the tension of the spring 212 by means of the detent 213, as shown in Fig. 9, thus holding the pin 219 retracted, so as not to engage the tumbler-cam 67 as the cylinder rotates, and one of the levers 200 200[a] is held against the tension of its spring 202 to prevent its arm 231 from engaging the corresponding tappet-lever 230 by means of the cam 206 engaging its arm 204, and the other of the levers 200 200[a] is held against the tension of its spring to hold its arm 231 out of contact with the corresponding tappet-lever 230 by engagement of its antifriction-roll 203 with the roll of tympan on the tympan-roller A or B, as the case may be. Fig. 8 shows such position of the parts during the time that the tympan is being fed from the roller A to the roller B. When, however, the tympan has been almost unwound from the delivery-roller the lever 200 or 200[a], whose antifriction-roller 203 has been pressing against the tympan on the delivery-roller, will have been moved by its spring so as to carry its arm 231 into engagement with the corresponding tappet-lever 230, and when only, say, two or three thicknesses of the tympan remain on the delivery-roller the arm will have been moved so far as to have caused the tappet-lever to withdraw the detent 213, so as to release the spindle 211. Such position of the parts is shown in Fig. 6, in which the movement of the tympan has been from the roller B to the roller A, as indicated by the arrows. The spindle having been released by the detent 213 will be free to move outward under the tension of its spring 212, except as such movement is restrained by the engagement of the roll 222 on the lever 221 with the cam 223, and as soon as the depressed portion of the cam 223 comes opposite the roll 222 the spindle will move outward, thereby rocking the lever 218 to throw the pin 219 into the path of the tumbler-cam 67, as shown in Figs. 5 and 7, whereby as the rotation of the cylinder continues the reversing-shaft 90 will be given a one-quarter rotation to cause the reversing of the movement of the tympan-feeding mechanism. By this movement of the shaft 90 also the cam 206 will be moved to engage the arm 204 of the lever 200 to hold said lever out of operative position and the arm 204 of the lever 200[a] will be released to allow the roll 203 of said lever to contact with the roll of tympan on the tympan-roller A, which now becomes the delivery-roller, the parts being then in the position shown in Figs. 7 and 8. After the tumbler cam 67 is moved out of engagement with the pin 219 by the rotation of the cylinder the lever 221 is rocked by the cam 222 to throw the spindle 211 back to its normal position and to cause the lever 218 to be rocked to retract the pin 219 out of the path of the cam 67, and the detent 213 having been released by the movement of the lever 200 by the cam 206 will again engage the spindle to hold it in its normal retracted position. The spindle will then remain retracted until the tympan has been almost unwound from the tympan-roller A, when it will be again released through the action of the lever 200[a] to cause another quarter-rotation of the shaft 90, as before, and consequent reversing of the movement of the tympan.

The cam 223 is driven so as to make one revolution for each two revolutions of the impression-cylinder, the impression-cylinder being supposed to make two revolutions for each impression, and the cam is timed so as to permit the outward movement of the spindle 211 only at a time to cause the pin 219 to engage the tumbler-cam on the shaft 90 on the desired alternate revolutions of the impression-cylinder.

It will be understood that I am not to be

limited to the exact construction shown and to which the foregoing description has been mainly confined, but that the invention includes modifications and changes therein within the claims.

What I claim is—

1. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and from one of which rollers the tympan is wound onto the other, of means for determining the extent of the movement of the tympan according to the size of the roll of tympan on one of the carrying-rollers, substantially as described.

2. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of means for determining the extent of movement of the tympan in one direction according to the size of the roll of tympan on one of the carrying-rollers, substantially as described.

3. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of means for determining the extent of movement of the tympan in one direction according to the size of the roll of tympan being unwound, substantially as described.

4. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of means for determining the time of reversal according to the size of the roll of tympan on one of the carrying-rollers, substantially as described.

5. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of means for determining the time of reversal according to the size of the roll of tympan being unwound, substantially as described.

6. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of means for controlling the operation of the reversing means by the roll of tympan on one of the carrying-rollers, substantially as described.

7. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of a member under tension to move toward one of the tympan-rollers and bearing against the roll of tympan on said roller, and means controlled by said member for controlling the operation of the reversing means, substantially as described.

8. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of a member under tension to move toward the delivering tympan-roller and bearing against the roll of tympan on said roller, and means controlled by said member for controlling the operation of the reversing means, substantially as described.

9. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of two members under tension to move one toward each of the tympan-rollers, means for holding said members alternately out of contact with the tympan on said rollers as the movement of the tympan is reversed, and means controlled by said members for controlling the operation of the reversing means, substantially as described.

10. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of a member and connections for controlling the operation of the reversing means, a detent for said member, and a tripping-lever controlled by the roll of tympan on one of the tympan-rollers to trip the detent, substantially as described.

11. The combination with an impression-

cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of a member and connections for controlling the operation of the reversing means, a detent for said member, and a tripping-lever under tension to move toward the delivering tympan-roller to trip the detent, substantially as described.

12. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of a member and connections for controlling the operation of the reversing means, a detent for said member, two tripping-levers, means for holding said levers alternately out of operation as the movement of the tympan is reversed, and means for holding the other of said levers in contact with the roll of tympan on the delivering-roller and under tension to move toward the delivering-roller to trip the detent, substantially as described.

13. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of a member and connections for controlling the operation of the reversing means, a detent for said member, a tripping-lever controlled by the roll of tympan on one of the tympan-rollers to trip the detent, and a cam moving in time with the impression-cylinder for governing the movement of said member, substantially as described.

14. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of a member and connections for controlling the operation of the reversing means, a detent for said member, a tripping-lever controlled by the roll of tympan on one of the tympan-rollers to trip the detent, and a cam moving in time with the impression-cylinder for governing the movement of said member and for returning said member to normal position, substantially as described.

15. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of tripping-levers 200 and 200ª having arms 201 and 231, a member and connections for controlling the operation of the reversing means, a detent for holding said member in normal position against spring tension, tappet-levers 230 for withdrawing said detent to release said member, means for holding said levers 200, 200ª alternately out of operation as the movement of the tympan is reversed, means for holding the other of said levers in contact with the roll of tympan on the delivering-roller and under tension to move toward the delivering-roller to engage the corresponding tappet-lever 230 to trip the detent, and means for returning said member to normal position, substantially as described.

16. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means including the shaft 90 for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of tripping-levers 200 and 200ª having arms 201, 204 and 231, a member and connections for controlling the operation of the reversing means, a detent for holding said member in normal position against spring tension, tappet-levers 230 for withdrawing said detent to release said member, cam 206 on shaft 90 for engaging the arms 204 of the tripping-levers 200 and 200ª alternately, means for holding the other of said levers in contact with the roll of tympan on the delivering-roller and under tension to move toward the delivering-roller to engage the corresponding tappet-lever 230 to trip the detent, and means for returning said member to normal position, substantially as described.

17. The combination with an impression-cylinder and tympan-shifting mechanism including two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means including a shaft 90 having a tumbler-cam 67 for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of a spring-pressed spindle 211 mounted centrally in the cylinder-shaft and free to move longitudinally thereof, a detent whereby the spindle is held in its normal retracted position, a tripping-lever under tension to move toward the delivering tympan-roller to trip the detent, an actuating-pin 219 for the tumbler-cam 67, and connections whereby the pin 219 is moved into operative position by the movement of the spindle 211, substantially as described.

18. The combination with an impression-cylinder and tympan-shifting mechanism in-

cluding two tympan-carrying rollers between which the tympan is stretched over the impression-surface of the cylinder and means including a shaft 90 having a tumbler-cam 67 for automatically reversing the direction of movement of the tympan to wind the tympan onto either carrying-roller from the other, of a spring-pressed spindle 211 mounted centrally in the cylinder-shaft and free to move longitudinally thereof, a detent whereby the spindle is held in its normal retracted position, a tripping-lever under tension to move toward the delivering tympan-roller to trip the detent, a cam 223 rotating in time with the impression-cylinder, a rocking lever 221 controlled by said cam and controlling the movement of the spindle 211, an actuating-pin 219 for the tumbler-cam 67, and a rocking lever 218 connecting the pin 219 with the spindle 211, substantially as described.

19. The combination with two web-carrying rollers, means for causing the web to be wound from one of said rollers onto the other, and means for automatically reversing the direction of movement of the web, of two members under tension to move one toward each of the carrying-rollers, means for holding said members alternately out of contact with the web on said rollers as the movement of the web is reversed, and means controlled by said members for controlling the operation of the reversing means, substantially as described.

20. The combination with two web-carrying rollers, means for causing the web to be wound from one of said rollers onto the other, and means for automatically reversing the direction of movement of the web, of a member and connections for controlling the operation of the reversing means, a detent for said member, and a tripping-lever under tension to move toward the delivering carrying-roller to trip the detent, substantially as described.

21. The combination with two web-carrying rollers, means for causing the web to be wound from one of said rollers onto the other, and means for automatically reversing the direction of movement of the web, of a member and connections for controlling the operation of the reversing means, a detent for said member, a tripping-lever under tension to move toward one of said carrying-rollers to trip the detent, and a cam for governing the movement of said member, substantially as described.

22. The combination with two web-carrying rollers, means for causing the web to be wound from one of said rollers onto the other, and means for automatically reversing the direction of movement of the web, of a member and connections for controlling the operation of the reversing means, a detent for said member, two tripping-levers, means for holding said levers alternately out of operation as the movement of the web is reversed, means for holding the other of said levers in contact with the roll of web on the delivering-roller to trip the detent, and a cam for governing the movement of said member and for returning said member to normal position, substantially as described.

23. The combination of the tripping-levers 200 and 200[a], spring-pressed spindle 211, detent 213 for said spindle, tappet-levers 230, means for holding one or the other of the tripping-levers out of action, and means for holding the other of said levers under tension to engage the corresponding tappet-lever 230 to trip the detent 215, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

THOMAS M. NORTH.

Witnesses:
A. L. KENT,
C. J. SAWYER.