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L. C. CROWELL.

INKING MECHANISM FOR PRINTING MACHINES.

No. 453,408. Patented June 2, 1891.

Fig. 1.

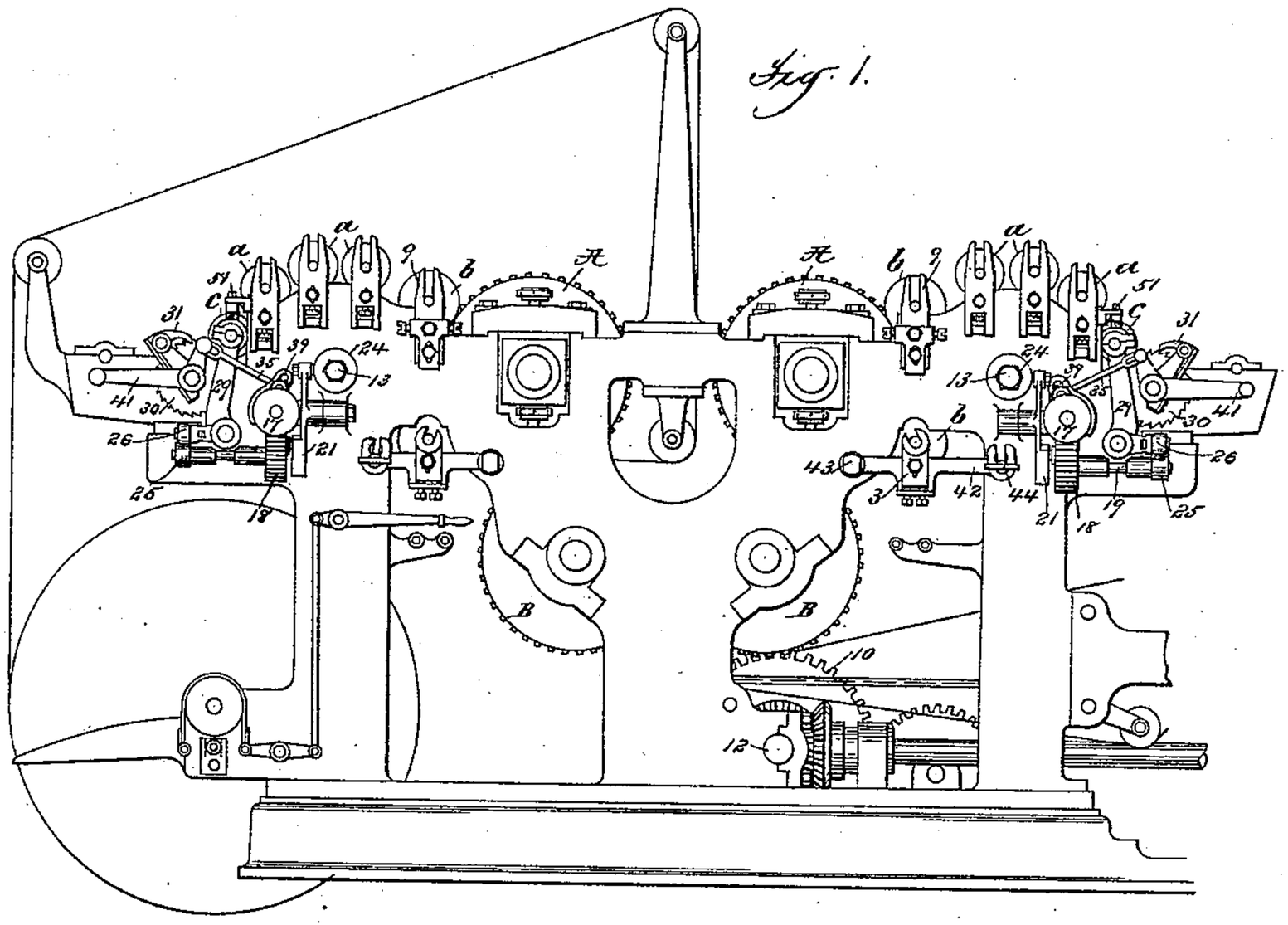
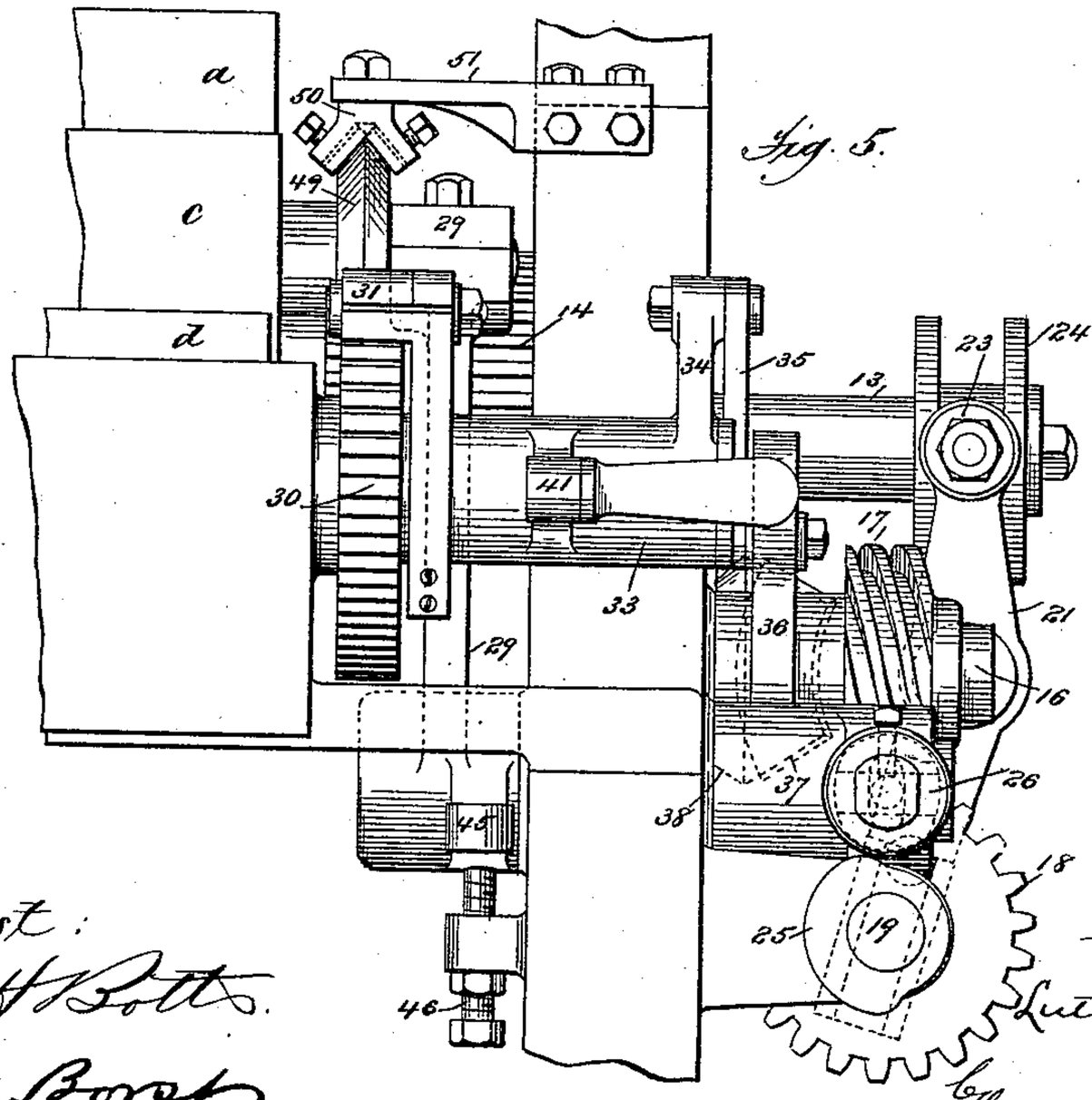


Fig. 5.



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INKING MECHANISM FOR PRINTING MACHINES.

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Fig. 2.

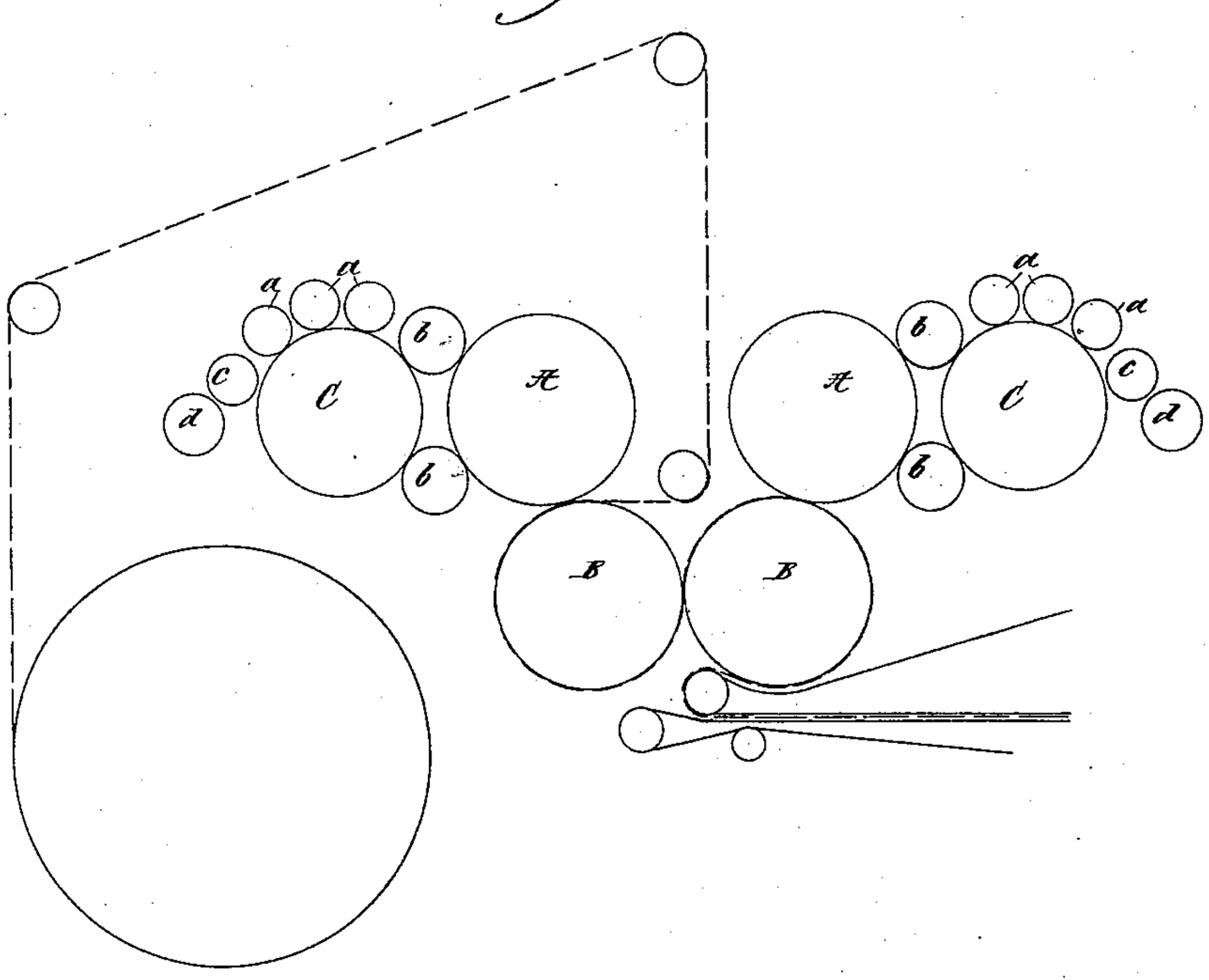


Fig. 6.

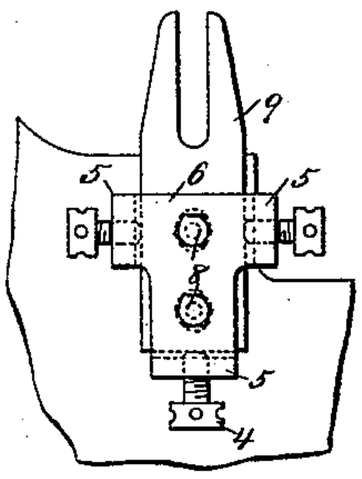


Fig. 7.

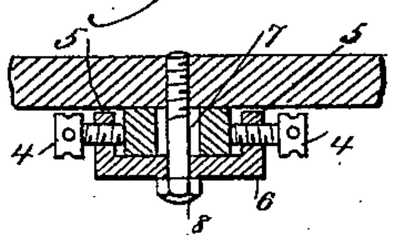
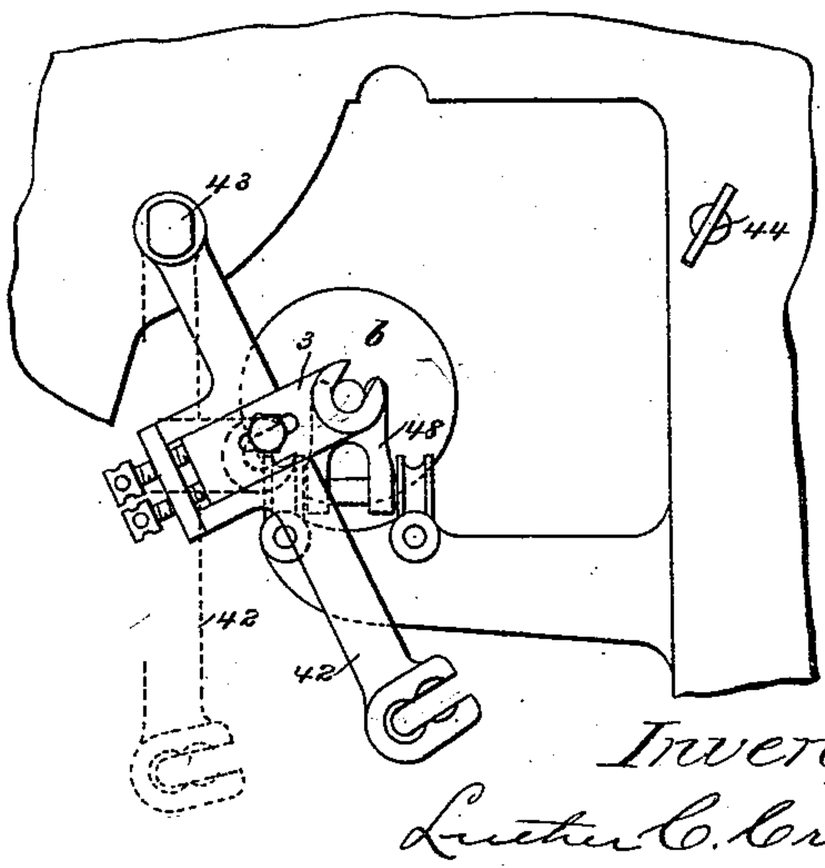


Fig. 8.



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INKING MECHANISM FOR PRINTING MACHINES.

No. 453,408. Patented June 2, 1891.

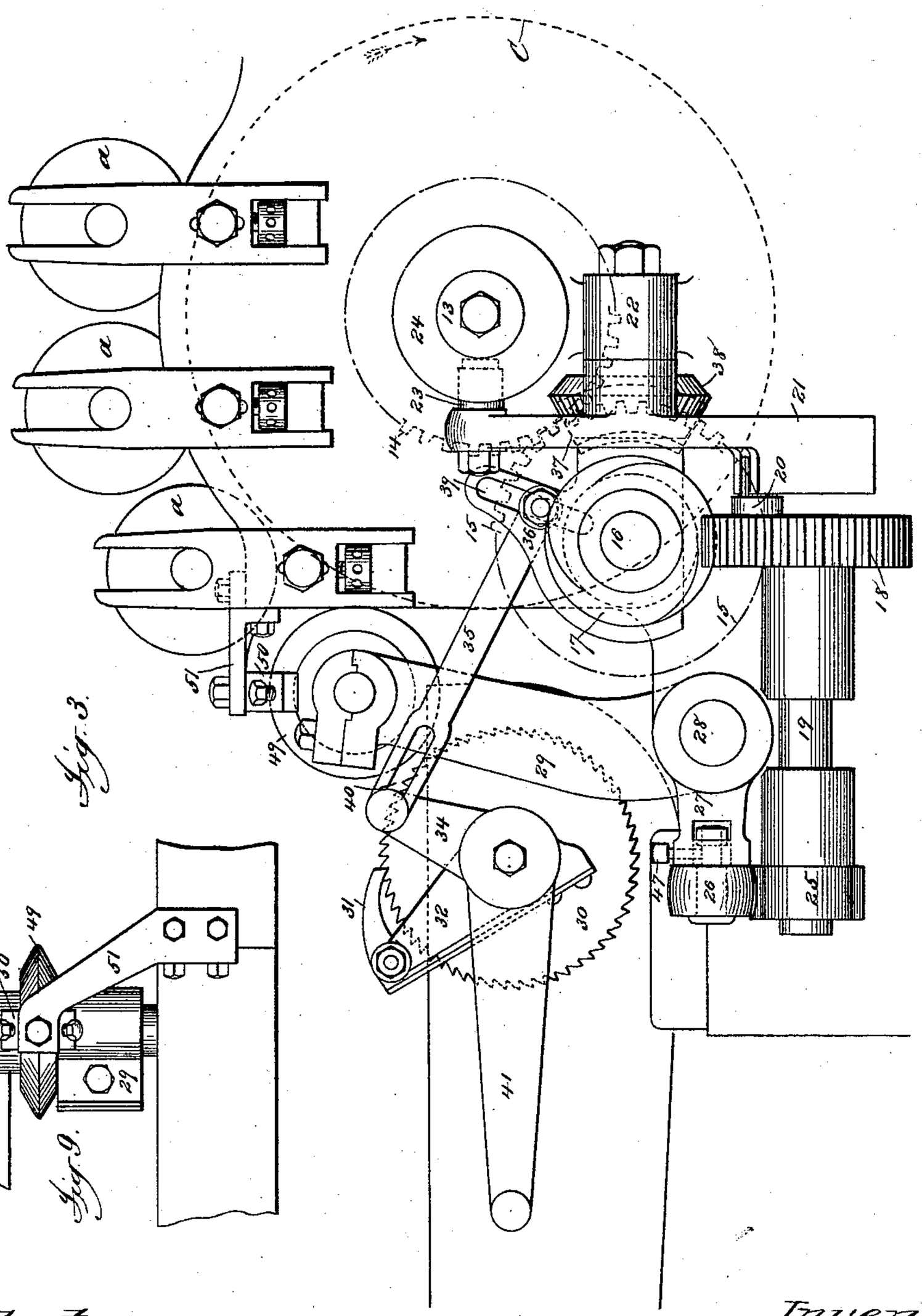

Fig. 3.

Fig. 9.

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INKING MECHANISM FOR PRINTING MACHINES.

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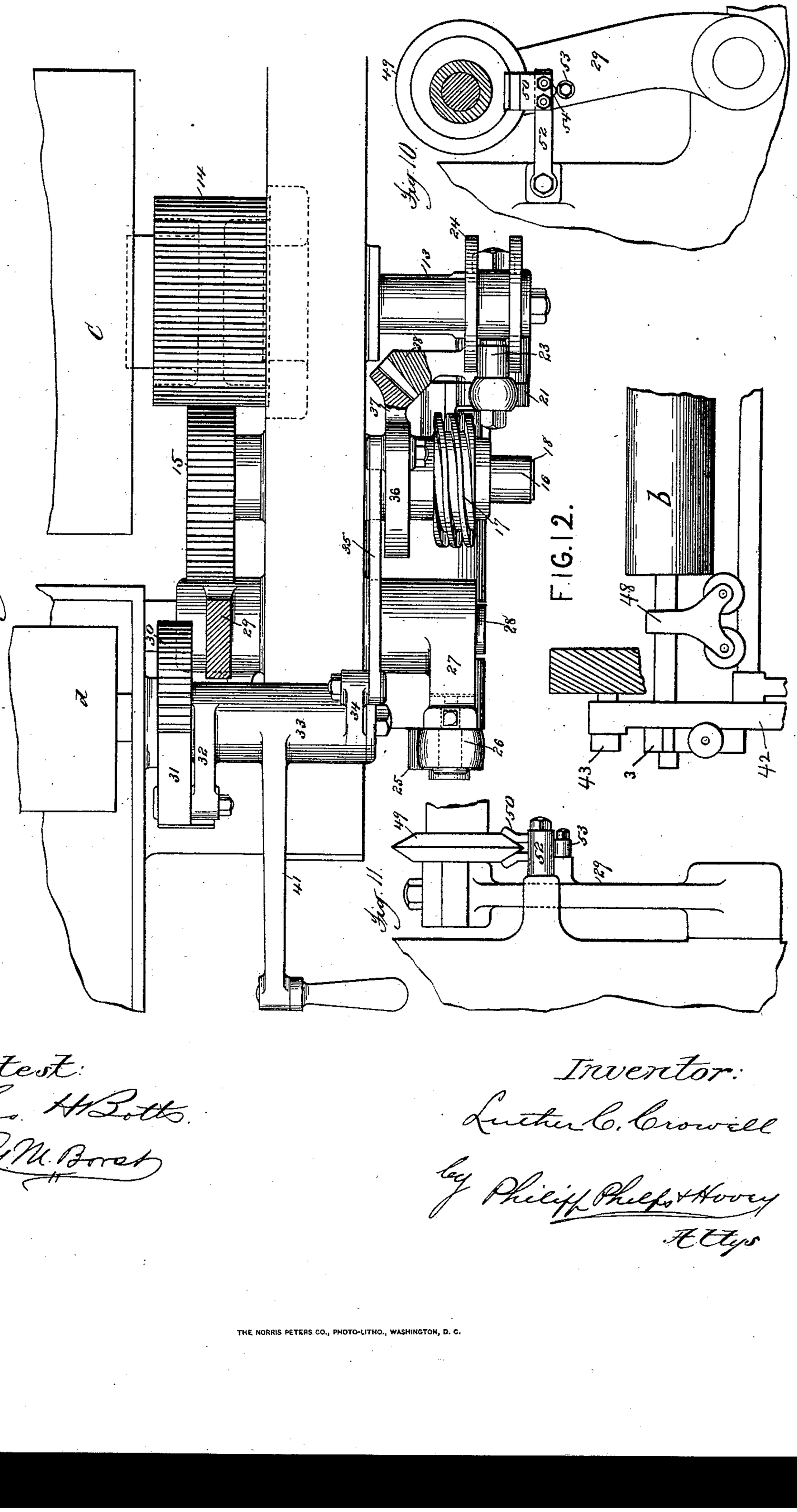

FIG. 12.

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UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ROBERT HOE, STEPHEN D. TUCKER, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

INKING MECHANISM FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 453,408, dated June 2, 1891.

Application filed May 16, 1888. Renewed November 12, 1890. Serial No. 371,148. (No model.)

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Inking Mechanism for Printing-Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in inking mechanisms which are designed for use in connection with a web-printing mechanism.

The invention consists in various details in the construction and organization of the mechanism, whereby it is greatly simplified and its operation rendered more certain and reliable, whereby a more easy and perfect adjustment of the form-rolls is obtained, and whereby the introduction and removal of these rolls is greatly facilitated.

A full understanding of the invention can only be given by an illustration and a detailed description of the improvements as applied to a web-printing mechanism. All further preliminary description of the invention will therefore be omitted and a detailed description given, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a web-printing mechanism provided with inking mechanisms constructed and organized according to the present invention. Fig. 2 is a diagrammatic sectional view of the same. Fig. 3 is an enlarged view of a portion of Fig. 1. Fig. 4 is a plan view, partly in section, of the parts shown in Fig. 3. Fig. 5 is an elevation of the same parts, looking from the left of Figs. 3 and 4. Figs. 6, 7, 8, and 9 illustrate details. Figs. 10 and 11 illustrate a modification which will be hereinafter referred to. Fig. 12 is a detail showing the carriage for the form-rolls.

Referring to said figures, it is to be understood that A represents the form-cylinders, and B the impression-cylinders, of a web-printing mechanism organized substantially as shown and described in my prior application for Letters Patent, filed March 7, 1888, Serial No. 266,393. It is to be understood, however, that the form and impression cylinders of the printing mechanism may be arranged in any other suitable manner. These cylinders are geared together in the usual manner and are driven through a gear 10 from the main driving-shaft 12.

The inking mechanisms for the two form-cylinders consist of the usual distributing-cylinders C, which are suitably geared to the form-cylinders, distributing-rolls *a*, which run in contact with the distributing-cylinders, form-rolls *b*, which take the ink from the distributing-cylinders and apply it to the forms upon the form-cylinders, and vibrating transfer-rolls *c*, which transfer the ink from the fountain-rolls *d* to the distributing-cylinders, all of which rolls and cylinders are arranged and operate in substantially the usual manner.

In inking mechanisms thus organized it is necessary that the fountain-rolls *d* should be rotated so as to present more or less of the freshly-inked surface to the vibrating transfer-rolls *c*, that the transfer-rolls *c* should be vibrated at regular intervals from the fountain-rolls to the distributing-cylinders to transfer the ink from the former to the latter, and, in order to secure good distribution, that the distributing-cylinders should have a longitudinal as well as a rotary movement.

It is the object of the present invention to provide means for securing these various movements which shall be more simple and efficient and occupy less space upon the outside of the main frame-work than those heretofore in use. To this end the shafts 13 of the distributing-cylinders are provided with broad-faced gears 14, which engage with gears 15, mounted upon short shafts 16, which extend through the side frame upon one side of the machine and are provided with worms 17, which engage with worm-gears 18, mounted upon short horizontal shafts 19, supported upon the side frame. The faces of the gears 18 are provided with eccentric studs or crank-pins 20, which enter grooves formed in the lower ends of rocking levers 21, which are fulcrumed in brackets 22, secured to the frame, and are provided at their upper ends with

studs or bowls 23, which extend into grooves formed in the peripheries of pulleys 24, secured upon the ends of the shafts 13 of the distributing-cylinders.

The inking mechanisms for the two form-cylinders are exact duplicates, and the illustration of one therefore applies to both. By this means it will be seen that the rotary movement of the distributing-cylinder operates through the connections which have been described to impart an endwise or longitudinal movement thereto sufficient to secure the proper distribution. This construction relieves the type-cylinder shaft entirely from the strain of the longitudinal motion of the distributing-cylinder and groups in small compass about the shaft of the distributing-cylinder all the mechanism for reciprocating the same, thus economizing space—an important feature in web-printing machines. The type-cylinder also, by the removal from its shaft of all connections for reciprocating the distributing-cylinder, can more readily be adjusted in proper position in the machine—an adjustment which is frequently necessary in web-printing machines.

The shaft 19, in addition to the gear 18, is also provided with a cam 25, which engages with a stud or bowl 26, mounted upon the end of a rock-arm 27, which extends from a shaft 28, having upwardly-extending rock-arms 29, only one of which is shown, upon which is supported the transfer-roll *c*. By this means at each revolution of the shaft 19 the arms 29, carrying the transfer-roll, are vibrated so as to carry said roll from the fountain-roll *d* to the distributing-cylinder, and thus transfer the ink from the former to the latter. The return movement of the transfer-roll is effected by means of springs, (not shown,) which are arranged and act in the usual manner. The movement of the transfer-roll toward the fountain-roll is limited by means of an arm 45, extending from the shaft 28, and the movement of which is limited by an adjusting-screw 46. By this means the pressure of the transfer-roll upon the fountain-roll can be regulated with great nicety. The bowl 26 is mounted upon a stud which is adjustable in the arm 27, and is provided with an adjusting-screw 47, by which the stud and bowl can be adjusted to regulate the movement of the transfer-roll toward the distributing-cylinder, and thus regulate the pressure of the roll against the cylinder. As the roll becomes gradually reduced in diameter by shrinkage or wear, (for it will be understood that the transfer, form, and distributing rolls are usually made of a flexible composition cast upon an iron core,) these adjustments enable proper compensation to be made for any change in diameter.

The transfer-roll is mounted to turn freely in the arms 29, in which it is supported, so that whenever it is in contact with either the fountain-roll or the distributing-cylinder it is driven by frictional contact, and the distributing-cylinder being driven at a comparatively high rate of speed the transfer-roll sometimes attains such a velocity from its contact with the cylinder that when vibrated back into contact with the fountain-roll its movement will be sufficient to give a partial rotation to the latter roll, and thus produce over-inking. It is therefore desirable that the rotary movement of the transfer-roll should be arrested or partially arrested before it comes into contact with the fountain-roll. To effect this the shaft of the transfer-roll is provided at one or both ends with a pulley 49, (see Fig. 9,) which is engaged by a friction-brake 50, which is supported upon an arm 51, extending from the frame of the machine and arranged to engage with the pulley as the transfer-roll arrives in its mid-position in its vibrations between the distributing-cylinder and the fountain-roll. The pulley 49 is preferably slightly eccentric of the shaft of the transfer-roll, so that as the transfer-roll, as shown in Fig. 10, revolves by the momentum acquired from contact with the distributing-cylinder the eccentric portion of the pulley, coming into engagement with the brake, will increase the friction between the pulley and brake, and thus cause the brake to more easily arrest the revolution of the roll.

The operation of this device is as follows: The transfer-roll when it is vibrated into contact with the distributing-cylinder will be set in motion by frictional contact with the cylinder, and this motion will continue as it is vibrated back to the fountain-roll. As the transfer-roll arrives at its mid-position between the distributing-cylinder and fountain-roll the pulley or disk 49 will engage with the brake 50, and the friction thus applied to the disk will overcome the momentum of the roll and arrest or substantially arrest its revolving movement before it comes into contact with the fountain-roll. As the transfer-roll is vibrated back to the distributing-cylinder it will have no rotary movement, or only such slight movement as it has acquired from contact with the fountain-roll; but as the disk 49 passes in contact with the brake 50 the brake will operate to impart a slight rotary movement to the transfer-roll, so that when the roll comes into contact with the distributing-cylinder it will already have a rotary movement, and will thus be prevented from sliding in contact with the cylinder, which sliding contact tends to wear the roll and cylinder and produce uneven inking. Although, as shown in the drawings, but one end of the transfer-roll is provided with the disk 49 and brake 50, it will be understood that the other end of this roll is similarly provided. The brake 50 will preferably be so constructed as to be slightly yielding. Although, as shown, the pulley 49 is V-shaped on its periphery, and the brake is correspondingly shaped and provided with leather surfaces which are capable of adjustment by means of screws, it

will be understood that these devices may be widely varied without departing from the invention. One of the many other forms which may be successfully applied is illustrated in Figs. 10 and 11. In this case the brake 50 is carried upon the end of a bar 52, which is pivoted to the frame-work and rests upon a stud or bowl 53, projecting from the side of the arm 29. The arm 52 is provided with a cam projection 54, which as the transfer-roll is vibrated in either direction is acted upon by the bowl 53, so as to raise the arm 52 and press the brake against the pulley or disk 49, and thus arrest the roll or give it a slight rotary movement, as the case may be.

The necessary rotation of the fountain-roll *d* is effected as follows: The shaft is provided with a ratchet 30, which is engaged by a spring-pressed pawl 31, mounted upon a rock-arm 32, extending from a sleeve 33, mounted loosely upon the shaft of the roll. This sleeve is also provided with a rock-arm 34, which is connected by a link 35 with a vibrating arm 36, mounted loosely upon the shaft 16 inside the worm 17. This arm 36 is provided upon one side with a segment 37, which engages with a corresponding segment 38, extending from the lever 21, and having its axis coincident with the fulcrum of said lever. By this means the vibrations of the lever 21 operate to rock the segment 38, and thus impart a corresponding vibrating movement to the segment 37, which movement is imparted through the link 35 to the rock-arms 34 32 and pawl 31, thereby causing said pawl to engage with the ratchet 30 and rotate the fountain-roll with a step-by-step movement, so as to deliver the ink upon its surface to the vibrating transfer-roll *c*. In order to vary the movement of the fountain-roll to cause it to deliver a greater or less amount of ink to the transfer-roll, which is of course necessary, in order to cause the inking to conform to the different classes of work to be produced, the arm 36 is provided with a slot 39, through which the bolt which connects the link 35 to the disk passes, so that the point of connection of the link to the arm can be varied so as to give the link a greater or less amount of movement, and thus cause the pawl to be retracted the length of one or more teeth of the ratchet, so as to impart a greater or less movement to the fountain-roll, as may be required. The slot in the arm 39 will preferably be provided with graduations corresponding to that of the requisite number of teeth to be moved, which will aid in securing the proper adjustment of the bolt in the slot. As this movement is one which causes the forward movement of the pawl to begin very gradually, increasing to the middle of its throw and then gradually decreasing until the end of its stroke is reached, (the return being made in the same manner,) it will be seen that as the length of stroke or movement of the fountain-roll is determined by the position of the bolt in the arm 39 (*i. e.*, being at the bottom of the slot when the least motion is required or at top for the greatest) the nature of the movement is the same, and as in every case the pawl is brought slowly into engagement with the teeth of the ratchet there is no liability of breaking the teeth or other part of the mechanism. The link 35 is provided with a slot 40, through which the stud connecting the link to the rock-arm 34 passes, and in which the stud is permitted to move freely, and the sleeve 33 is provided with a hand-lever 41, which by its weight insures its backward movement and also permits the sleeve to be operated independently of the link 35, so as to operate the fountain-roll by hand to bring inked portions of the roll into position to deliver ink to the transfer-roll *c* in "inking up" or when the machine is first started.

In order to properly adjust the upper form-roll *b* so as to cause it to bear properly upon the form and distributing-cylinders, the bearings 9, in which the roll is supported, are made adjustable as follows: These bearings or sockets are secured to the frame-work by means of bolts 8, (see Figs. 6 and 7,) which pass through enlarged openings 7 in the bearings, but fit snugly in smaller openings in cap-pieces 6, which fit over the bearings, and are provided with flanges 5, which extend inward at the sides and bottom of the bearings. These flanges 5 are provided with adjusting-screws 4, which bear, respectively, against the opposite sides and bottom of the bearings 9. From this arrangement it will be seen that by loosening the bolts 8 slightly and then operating the screws 4 the sockets can be adjusted vertically and laterally, so as to bring the roll into any desired position with great nicety. After the roll has been thus adjusted to the proper position the bearings 9 can be locked by tightening up the bolts 8. To provide for the ready introduction and removal of the lower form-rolls *b*, the bearings 3 of these rolls (see Fig. 8) are mounted in swinging arms 42, which are pivoted on the frame-work at 43, so as to be capable of swinging downward and upward to lower and raise the rolls from and into position. The opposite ends of the arms 42 are secured to the frame-work, so as to support the rolls in position by means of locking-bolts 44, which engage with recesses in the ends of the arms. The bearings 3 are adjustable upon the arms 42 in the same manner that the bearings 9 are adjustable upon the frame-work, or in any similar manner.

The manner of introducing and removing the lower form-rolls is as follows: To introduce the rolls the arms 42 are swung downward to a pendent position, as indicated by dotted lines in Fig. 8. The journal of one end of the roll is then recived by the usual carriage 48, (see Figs. 8 and 12,) and the roll is run into the machine in the usual manner. Attendants upon each side of the machine then swing the arms 42 up to their horizontal

position, and as the arms are thus raised the bearings 3 take over the journals of the roll, as shown in Fig. 8, and raise the roll into position. The arms 42 are then secured by the locking-bolts 44. To remove the roll the operation is simply reversed. When it is desired, as is often the case, to simply remove this roll out of contact with the cylinders without removing it entirely from the machine, the locking-bolts 44 are loosened, so as to permit the arms 42, supporting the roll, to be lowered sufficiently for the purpose, when the bolts 44 are again turned so as to enter the upper recesses provided therefor and tightened, as before.

What I claim is—

1. The combination, with the fountain-roll and its pawl and ratchet, of the vibrating arm 36, the link 35 for operating the pawl, adjustably connected to said arm, whereby the throw of the pawl is varied, the distributing-cylinder, and connections between the shaft of the distributing-cylinder and the arm 36, whereby the latter is operated, substantially as described.

2. The combination, with the distributing-cylinder C and its shaft 13, of the rocking lever 21 for moving the cylinder longitudinally, and driving connections between the lever and the shaft 13, whereby the lever is rocked by the rotation of the shaft, substantially as described.

3. The combination, with the distributing-cylinder C, of the rocking lever 21 for moving the cylinder longitudinally, the shaft 19, driven from the cylinder and operating the lever 21, the fountain-roll and its pawl and ratchet, and the vibrating arm 36, operated from the lever 21 and connected to operate said pawl, substantially as described.

4. The combination, with a fountain-roll and a distributing-cylinder, of a transfer-roll vibrating between the fountain-roll and the distributing-cylinder, a shaft, and means operated thereby for vibrating the transfer-roll, and a worm driven from the distributing-cylinder for operating the shaft, substantially as described.

5. The combination, with the fountain-roll and the distributing-cylinder, of the vibrating transfer-roll, the shaft 19, having the cam 25 for operating the transfer-roll, and the worm 17, driven from the distributing-cylinder for operating the shaft, substantially as described.

6. The combination, with the distributing-cylinder, fountain-roll, and transfer-roll, of a friction-brake acting to check the rotary movement of said transfer-roll as it moves from the distributing-cylinder to the fountain-roll, substantially as described.

7. The combination, with the distributing-cylinder, fountain-roll, and transfer-roll, of a disk or pulley 49, carried by said transfer-roll, and a fixed friction-brake arranged to act upon said disk or pulley as the transfer-roll is vibrated to and from the distributing-cylinder, substantially as described.

8. The combination, with the bearings 9 of the form-rolls, of the cap-pieces 6, fitting over bearings, the bolts 8, and the adjusting-screws 4, substantially as described.

9. The combination, with the lower form-rolls, of bearings for said rolls supported upon swinging arms 42, said arms being provided with a plurality of recesses, and a bolt 44, secured to the frame and adapted to enter any one of the recesses, whereby the rolls may be held in or out of position, substantially as described.

10. The combination, with the lower form-rolls, of open bearings for said rolls supported upon swinging arms 42, and the carriage 48, adapted to receive the form-rolls, whereby the rolls can be placed in and removed from the machine, substantially as described.

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

LUTHER C. CROWELL.

Witnesses:
T. H. PALMER,
J. J. KENNEDY.