Feb. 15, 1927. 1,617,342

J. MURRAY

ROTARY PRINTING MACHINE

Filed Aug. 31, 1925 4 Sheets-Sheet 1

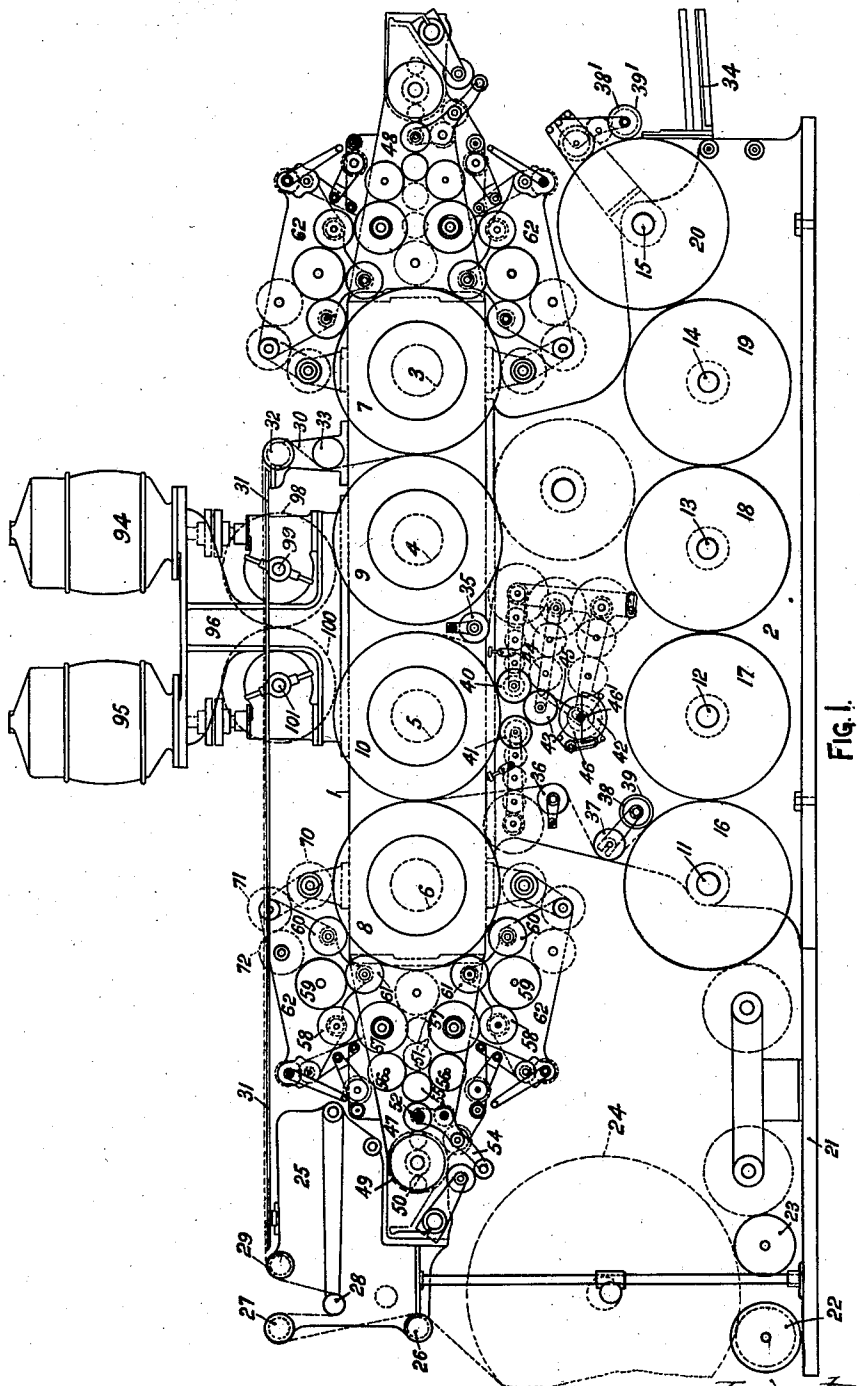

Fig. 1.

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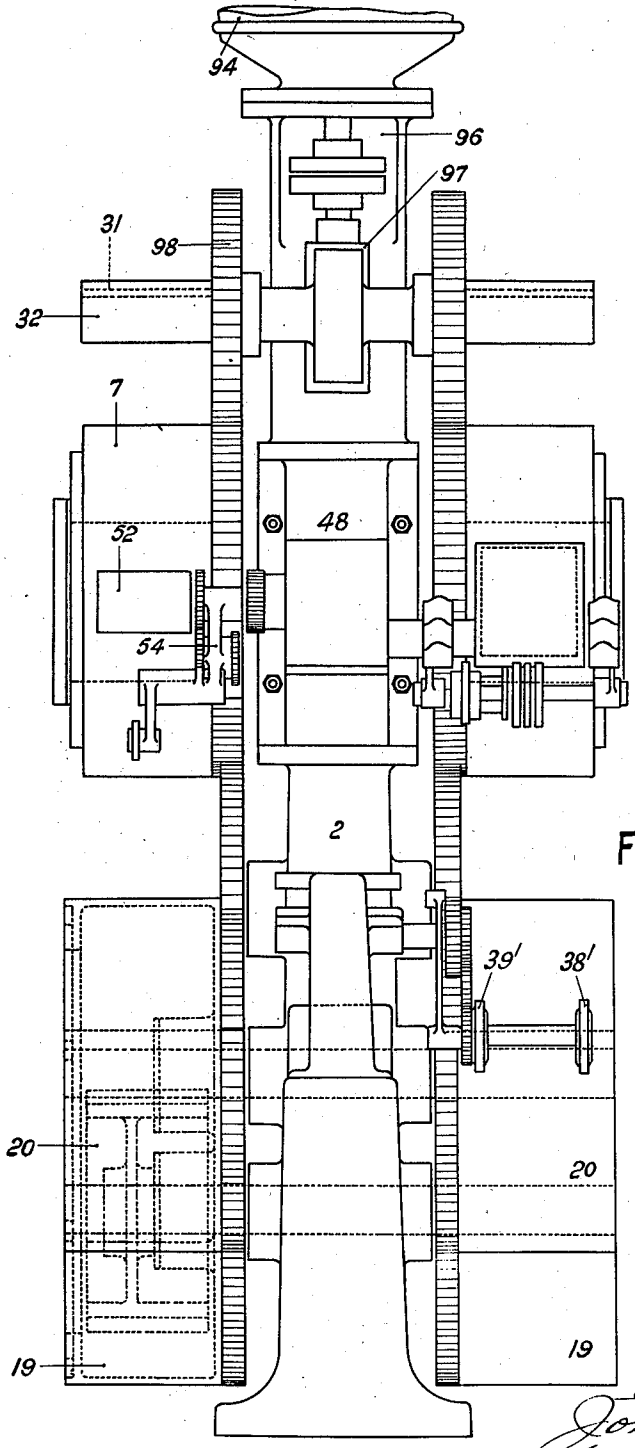

FIG. 2.

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ROTARY PRINTING MACHINE

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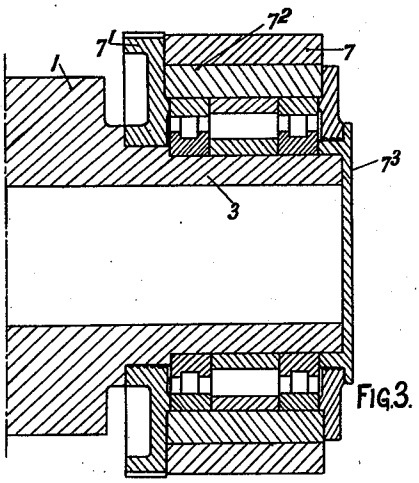

FIG. 3.

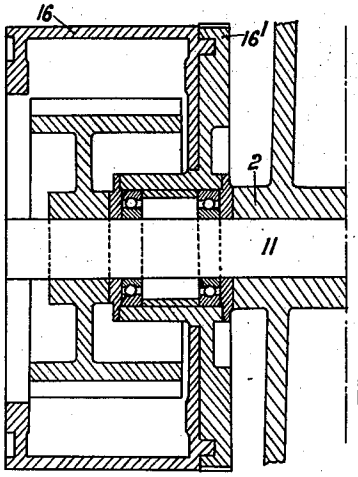

FIG. 4.

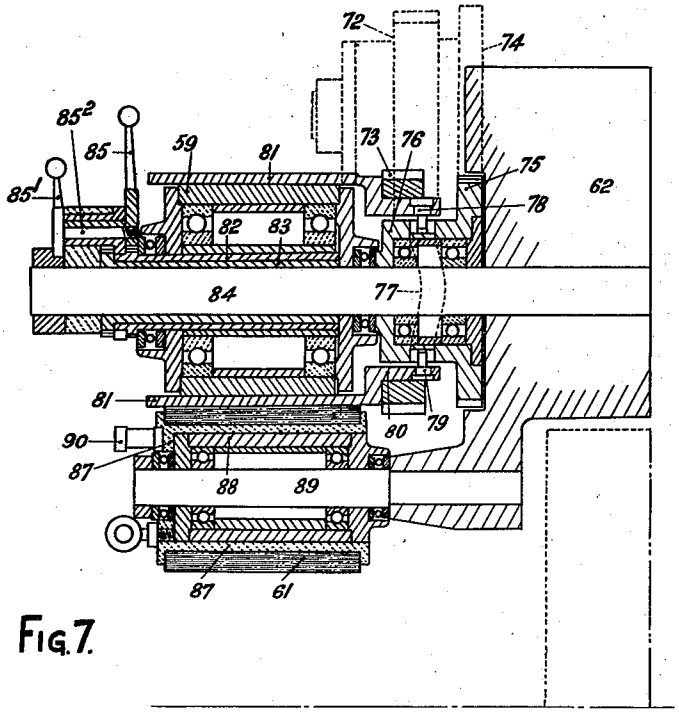

FIG. 7.

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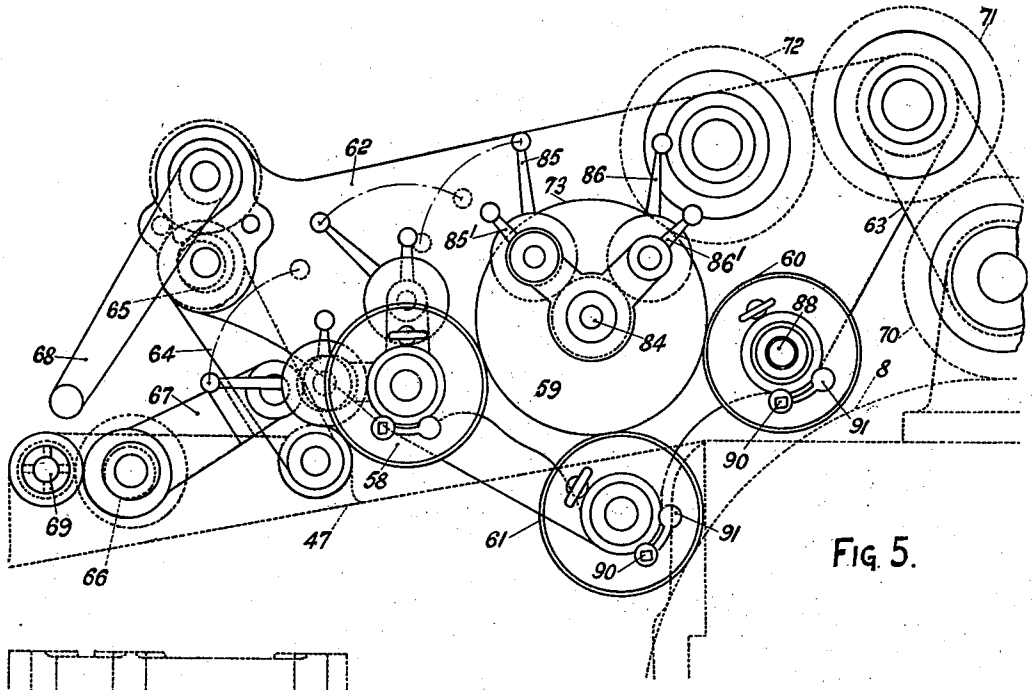

Fig. 5.

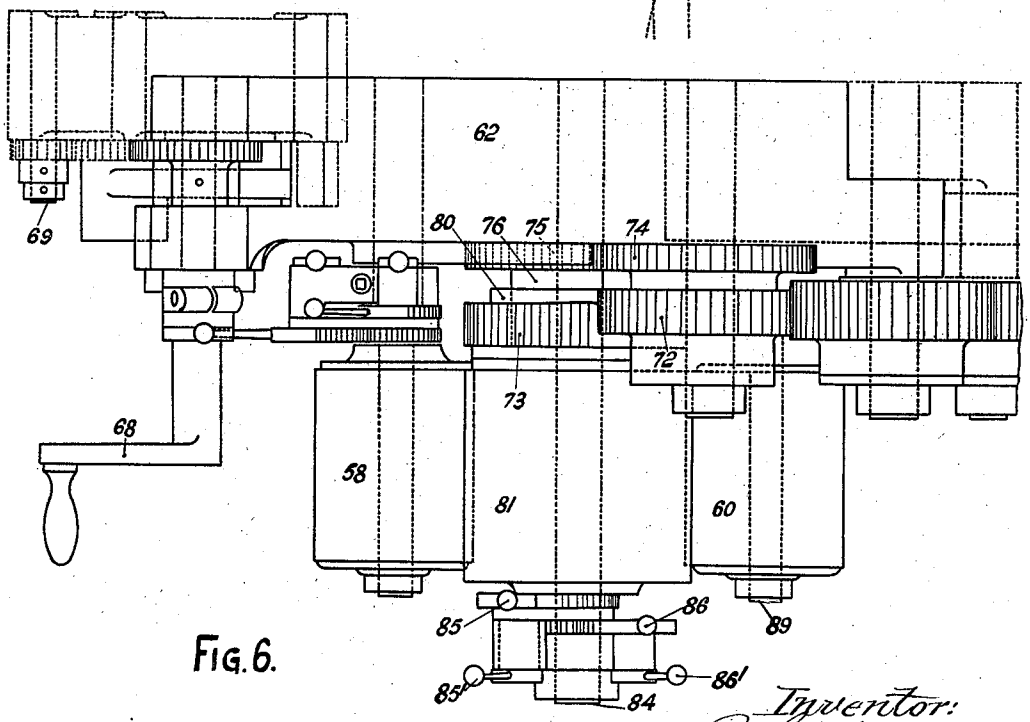

Fig. 6.

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Patented Feb. 15, 1927. 1,617,342

UNITED STATES PATENT OFFICE.

JOHN MURRAY, OF LONDON, ENGLAND.

ROTARY PRINTING MACHINE.

Application filed August 31, 1925, Serial No. 53,752, and in Great Britain September 9, 1924.

The invention has for its object to provide a rotary printing machine, more particularly for printing books, offering facilities in the matter of changing of the printing plates and the almost complete elimination of the operations involved in "making ready", capable of running at high speed, self-contained and occupying little floor space.

In a machine according to the invention, which as a whole is adapted to draw paper from a roll, print it upon each side, fold it, cut it and deliver it as separate signatures, the impression cylinders, the printing cylinders, the folding and cutting cylinders, and, if desired, also the whole or part of the inking mechanism with its rolls are supported entirely from one side of a main frame structure, with accessory elements hereinafter described, and are thus capable of withdrawal laterally of said structure. Preferably, there are two sets of cylinders, inking, unreeling, and delivering devices, one set arranged on either side of a central main frame-structure so that the machine is adapted to print two series of signatures simultaneously.

In a machine embodying the invention, referring to one side of a double-sided machine, there are supported at the upper part of the main, vertical, central frame structure, two pairs of impression and printing cylinders with their axes horizontal and substantially in one horizontal plane. These cylinders, as also the folding and cutting cylinders hereinafter referred to, may be supported to rotate upon fixed trunnions projecting laterally from the frame-structure, whether integral with or attached to said structure, or may be mounted on the outer ends of shafts supported in bearings in the main frame.

Paper is led from a roll supported at one end of the machine over and between the first pair of impression and printing cylinders, to be printed upon one side. Thence it passes over an aligning or positioning device such as a jockey pulley in the bight of the band of paper to the second pair of impression and printing cylinders to receive the corresponding impression on the opposite side. It then passes over a second like aligning or positioning device to the folding and cutting cylinders arranged below.

In order to prevent offsetting from the second impression cylinder against the face of which the immediately previously printed first impression lies, oil offset removing devices are provided.

Ink distributing devices are carried on extensions at the ends of the frame structure, the various rolls, so far as may be possible, being so carried as to be withdrawable endwise. The inking rolls and their immediate details are carried on brackets pivoted to links pivoted to the frame-structure so that they may be adjusted in regard to the printing surfaces which they serve. In order to preserve the alignment of these brackets the corresponding brackets at opposite sides of the machine are preferably formed with mutually engaging and supporting vertical faces.

In the trains of inking and distributing devices the usual endwise traversing distributing rollers are employed. In order that these may be readily accessible and detachable, means for traversing them from one end (that adjacent to the frame structure) are preferably provided.

The machine may be driven in any convenient manner.

In the case of a double-sided machine, for example, the mechanism on each side may be driven through worm gearing from a vertical motor.

An illustrative example of a rotary printing machine embodying the invention is shown somewhat conventionally in the accompanying drawings in which Fig. 1 is a side elevation, Fig. 2 an end elevation with certain parts of the machine removed, Figs. 3 and 4 fragmentary views in cross-sectional elevation to a larger scale, and Figs. 5, 6 and 7 fragmentary views in side elevation, plan and cross-sectional elevation, respectively, also to a larger scale.

As shown in the drawings (Figs. 1 and 2) the main frame is composed of two parts 1 and 2, the upper part 1 of which is mounted on and supported by the lower part 2.

Referring now to one side of this main frame, four trunnions 3, 4, 5 and 6 formed on the upper part 1 of the frame project laterally therefrom with their axes lying substantially in one horizontal plane. Rotatably mounted on the trunnions 3, 6, so as to be readily interchangeable for printing signatures of different numbers of pages are printing cylinders 7 and 8. Thus, the cylin-

der 7 is temporarily fixed to rotate with the gear-wheel 7^1 (Fig. 3) rotatable on the trunnion 3, the cylinder being slewed on a member 7^2 supported by a roller bearing and retained by a cap 7^3. Impression cylinders 9 and 10 are similarly mounted on the trunnions 4, 5, being spaced slightly apart to facilitate the threading of the paper. Below these cylinders and rotatably mounted on shafts 11, 12, 13, 14 and 15 which pass laterally through and are fixed to the lower part 2 of the main frame, are five folding cylinders 16, 17, 18, 19 and 20 one, 16, of which is shown more clearly in Fig. 4, being in rib and groove engagement with and bolted to a gear wheel 16^1 rotatable on ball bearings on the shaft 11.

Secured to one end of the base plate of the lower part 2 of the main frame and forming an extension thereof is a bracket 21 on which is mounted the lower portion of the unwinding gear, including unwinding rollers 22 and 23, supported by which is a paper reel 24. At the same end of the machine and rigidly connected to the upper part 1 of the main frame is a bracket 25 which carries the upper portion of the unwinding gear including guide rollers 26, 27 and 29 and a tension pulley 28. Extending along the top of the machine between the bracket 25 and a guide roller bracket 30, mounted on the upper part 1 of the main frame, is a guide plate 31. Carried by the bracket 30 are two guide rollers 32 and 33. At the end of the machine remote from the paper reel 24 and adjacent to the folding cylinder at that end is a delivery receiver 34.

The paper led from the reel 24 passes around the guide rollers 26 and 27, the tension pulley 28, the guide roller 29, then, by way of the guide plate 31 to the guide rollers 32 and 33. After leaving these rollers 32 and 33 it receives its first impression between the first printing cylinder 7 and the first impression cylinder 9. On leaving this impression cylinder 9 it passes around an adjusting roller 35 mounted on the main frame, then receives its second impression between the second printing and impression cylinders 8 and 10 and leaves these cylinders in a downward direction. After passing around further adjusting rollers 36 and 37 it is introduced to the series of folding cylinders, being held to the periphery of the first cylinder of the series by roller rings 38 and 39, receiving the first fold between the cylinders 16 and 17, the second fold between the cylinders 17 and 18, the third fold between the cylinders 18 and 19 and the fourth fold between the cylinders 19 and 20, and being delivered from the cylinder 20 in the form of completely folded signatures to the delivery receiver 34. Immediately before the folded sheet leaves the last folding cylinder 20 and in order that the turn of the fold may be withdrawn from the slot in the cylinder, it is subjected to the action of rubber rings 38^1, 39^1 which bear upon the outer layer of the folded sheet and which are driven through reduction gearing from the cylinder at a less peripheral speed than the cylinder.

Offset cleaning brushes 40 and 41, driven through trains of gearing from the first impression cylinder 9 and the second printing cylinder 8, bear on the under surface of the second impression cylinder 10 and are supplied with cleaning solution from a duct 42 by a roller 43 carried by a swinging arm 44 and driven by a train of gearing from the first impression cylinder 9, the roller 43 being periodically raised into contact with the cleaning brushes 40 and 41 and lowered into contact with the duct roller 46 by means of a link 45 which engages the arm 44 and is operated by a cam 46^1 on the duct roller 46.

At the ends of the upper part 1 of the central frame and forming extensions thereof are brackets 47 and 48 on each of which are mounted the ink supply mechanism for one printing cylinder and the corresponding transmission gearing. At the outer end of each of the brackets 47 and 48 is mounted an ink duct roller 49 driven through a train of epicyclic gear wheels 50 from a train of transmission gear wheels 51 which is in turn driven by a gear wheel carried by the corresponding printing cylinder 8 or 7. An ink feed roller 52 mounted on a reciprocatory arm 54 picks up the ink from the duct roller 49 and delivers it to a drum 55. This drum 55 is common to each of two series of distributing drums 56, 57, 58 and 59 and each of these series of drums delivers ink to two overhung form inking rollers 60 and 61 which are in operative contact with a printing cylinder. The form inking rollers 60 and 61 and the distributing drums 58 and 59 are mounted on frames 62 which also carry sets of adjusting mechanism. One set of adjusting mechanism is shown more clearly in Figs. 5, 6 and 7. One end of the frame 62 is connected to a bracket on the upper part 1 of the main frame by a link 63 and the other end of the frame 62 is supported by a link 64 which is mounted at one end on an eccentric 65 on the frame 62 and pivotally connected at the other end to the bracket 47. On the bracket 47 is an eccentric 66 which is operatively connected to the link 64 by another link 67. By movement of the eccentrics 65, 66 about their axes the frame 62 may be moved relatively to the printing cylinder, thereby adjusting the position of the form inking rollers 60 and 61 in relation to the surface of the printing cylinder. The eccentric 65 may be moved, through gearing, by operation of a hand lever 68; movement of the eccentric 66 is effected by similar gearing by operation of a

"tommy-bar" engageable with apertures in the shaft 69. The form inking rollers 60 and 61 are in frictional contact with the distributing drum 59 which is driven from the printing cylinder through a train of gear wheels 70, 71, 72 and 73. The distributing drum 59, in addition to its rotary motion, receives an endwise reciprocating motion which is derived as follows:—Attached to the gear wheel 72, which is in mesh with the gear wheel 73 on the distributing drum 59, is a gear wheel 74 (Figs. 6 and 7) of greater pitch diameter than the wheel 72. This wheel 74 is in mesh with a gear wheel 75 on which is formed a sleeve 76 which has on its periphery a cam track 77. Pins 78 and 79 in operative engagement with this cam track are secured to an extension 80 of the sliding sleeve 81 which forms the periphery of the distributing drum 59. Owing to the difference in pitch diameter of the wheels 72 and 74, the wheels 73 and 75 will be rotated at slightly different angular velocities, thereby causing slow relative rotary motion between the sleeves 76 and 81, which motion causes the cam track 77 to impart reciprocating motion, through the pins 78 and 79, to the sleeve 81. The distributing drum 59 may be adjusted to contact with the form inking rollers 60 and 61 by the angular movement of eccentrics 82, 83 on the shaft 84 by angular movement of levers 85, 86 and locked in the correct position by levers 85^1, 86^1 acting through screws such as shown at 85^2. Similar adjustments are provided for the rollers 58.

Each form inking roller, as 61, is mounted on an endwise movable sleeve 87 which is supported by a ballrace container 88 on the inking roller shaft 89. A stud 90 screw-threaded into the ballrace container 88 and passing through an aperture 91 in the end face of the sleeve 87 secures the sleeve to the ballrace container.

The mechanism of the machine is driven by two electric motors 94 and 95 which are mounted on a bracket 96 surmounting the main frame. Each motor drives the mechanism on one side of the machine. Power is transmitted from the motor 94 to the mechanism on the side of the machine which is shown in Fig. 1 through reduction gearing contained in a gear case 97, the gear wheel 98 which is fixed to the shaft 99 and the gear wheel 100 which is free to rotate on the shaft 101, the gear wheels 98 and 100 being in mesh with coacting wheels secured to the impression cylinders 9 and 10. The mechanism on the other side of the machine is driven by the motor 95 through similar gearing, the shaft 101 carrying a gear wheel similar to the gear wheel 98 and driven through reduction gearing from the motor 95.

What I claim is:—

In a rotary printing machine, in combination, a main frame, a printing cylinder supported on said frame, a bracket fixed to said frame, a movable frame, a link connection between said movable frame and said main frame, an eccentric on said movable frame, a link mounted on said eccentric and connected to said bracket, an eccentric on said bracket, a link connection between said second eccentric and said link, overhung-form inking rollers supported by said movable frame and means for rotating said eccentrics to adjust said movable frame and therewith said rollers towards and from said cylinder.

In testimony whereof I have signed my name to this specification.

JOHN MURRAY.