Aug. 30, 1927. 1,640,976

M. W. BRUESHABER

PRINTING PRESS

Filed Jan. 16, 1923 4 Sheets-Sheet 1

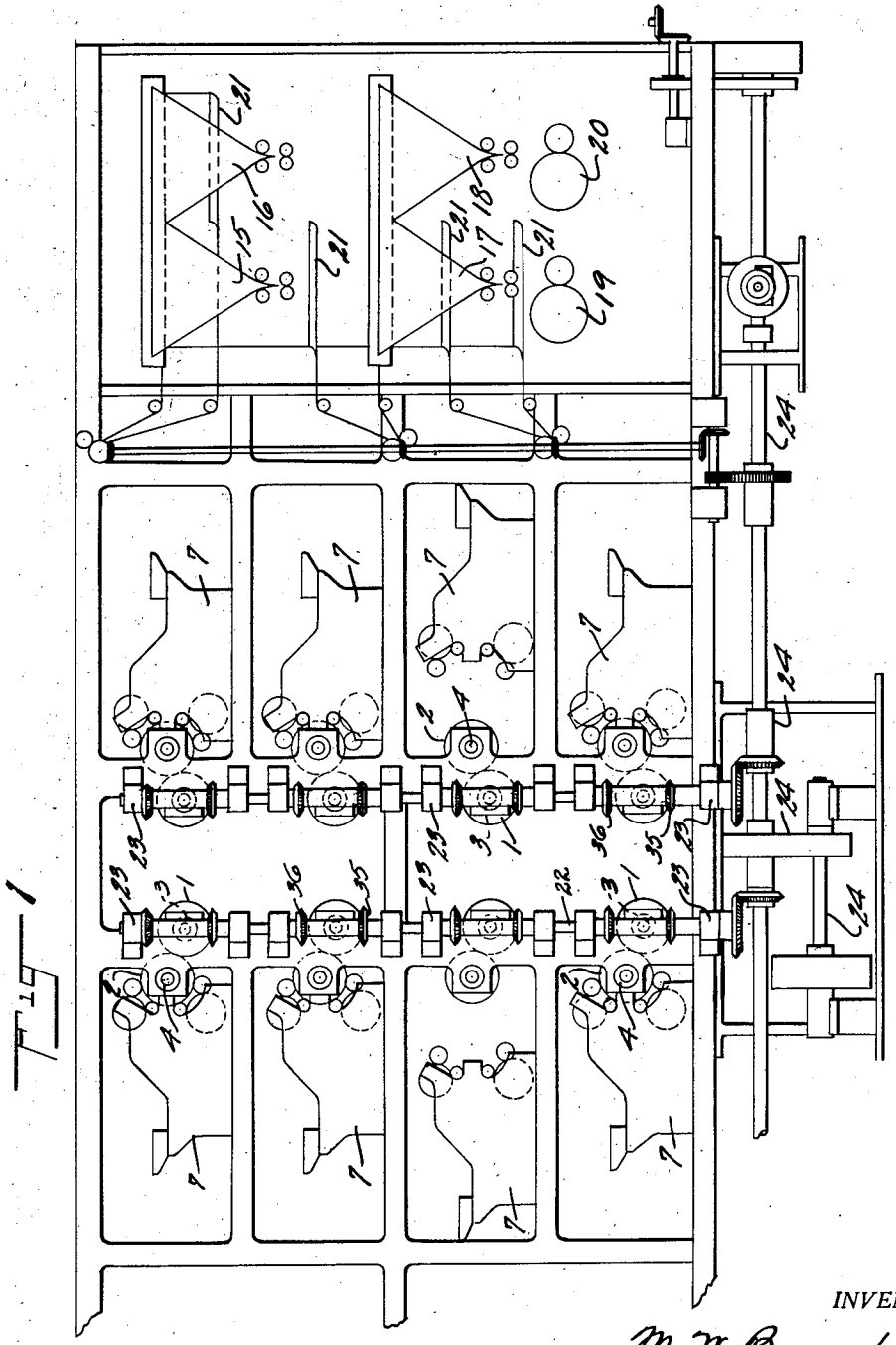


Fig. 1

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Fig 10

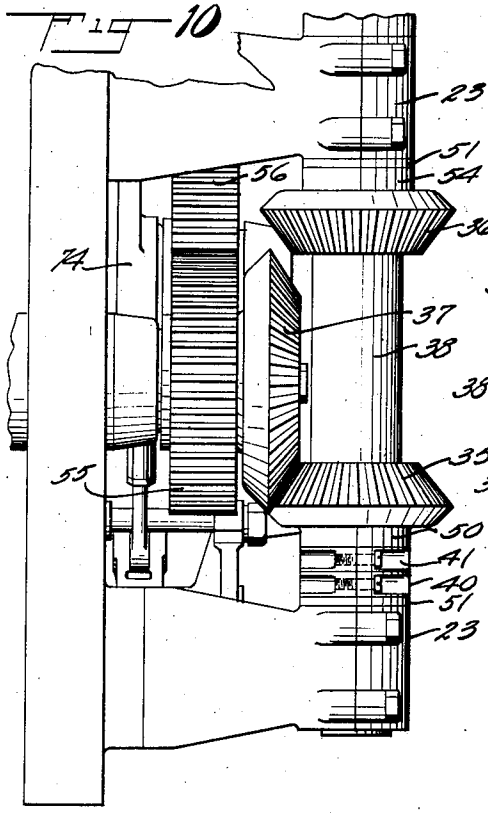


Fig 2

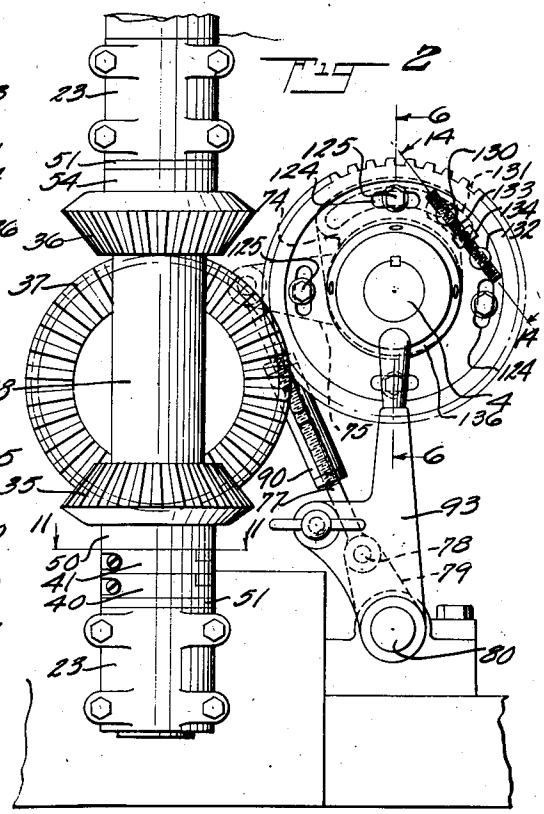


Fig 3

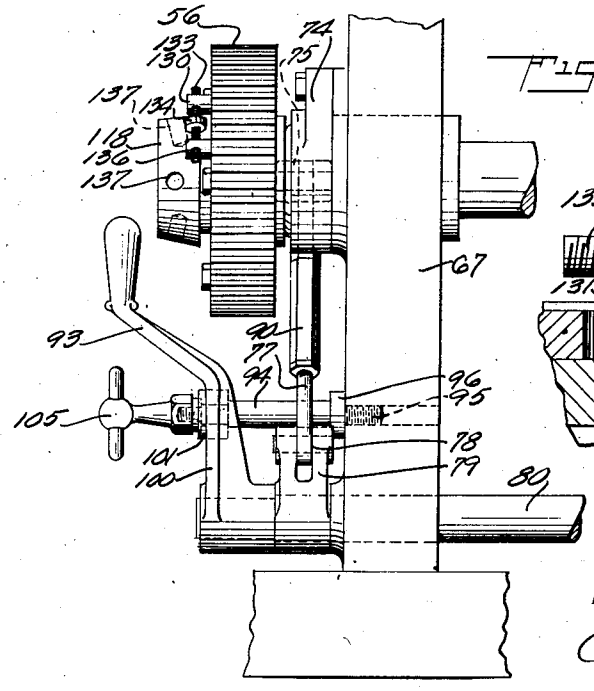
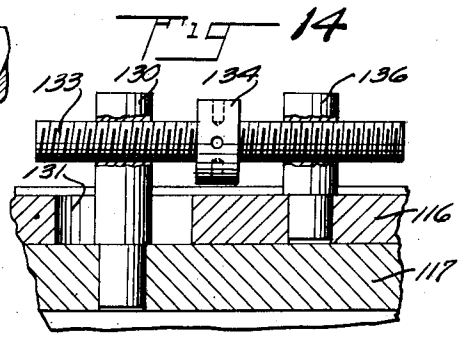


Fig 14



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Fig. 6

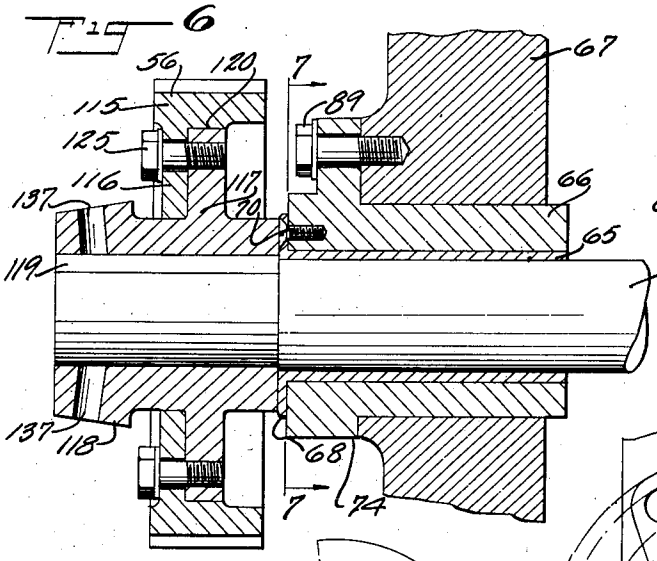


Fig. 7

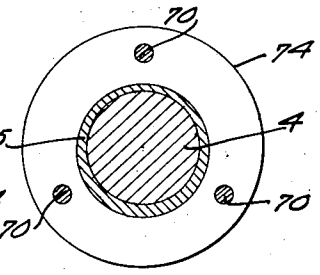


Fig. 5

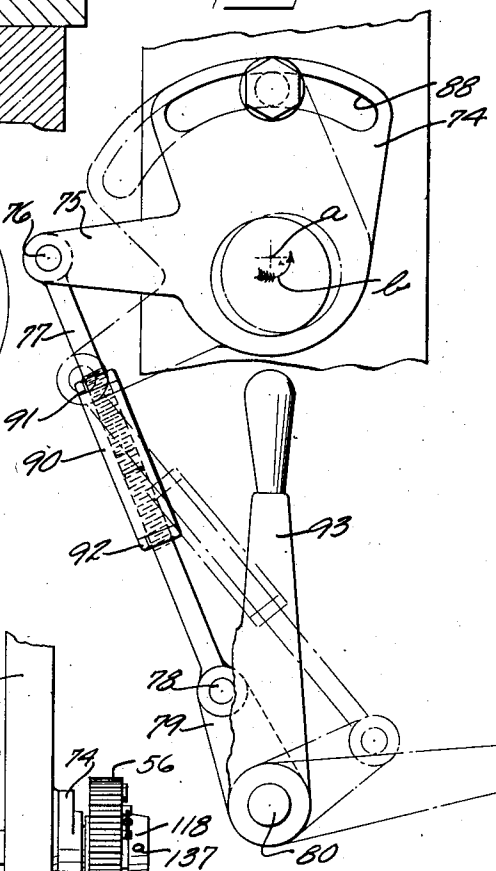


Fig. 11

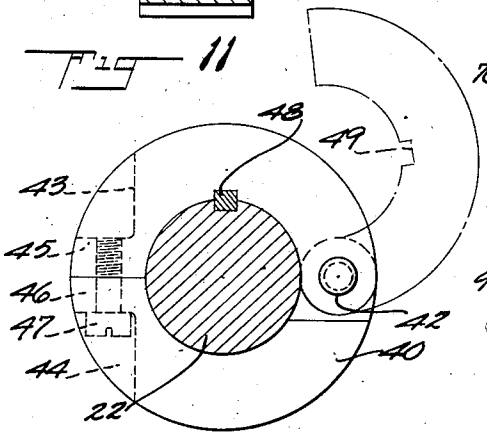
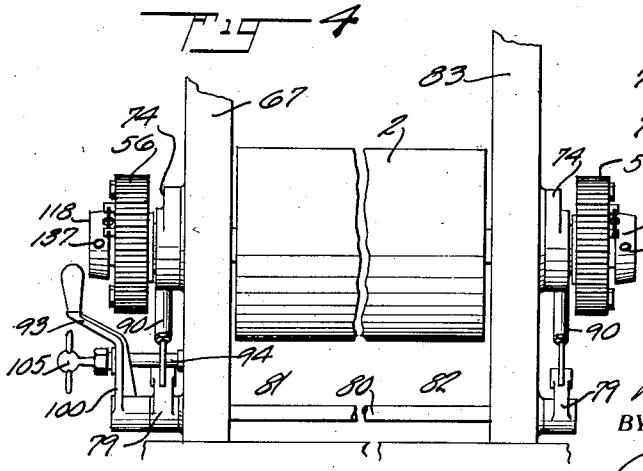


Fig. 4



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Fig 12

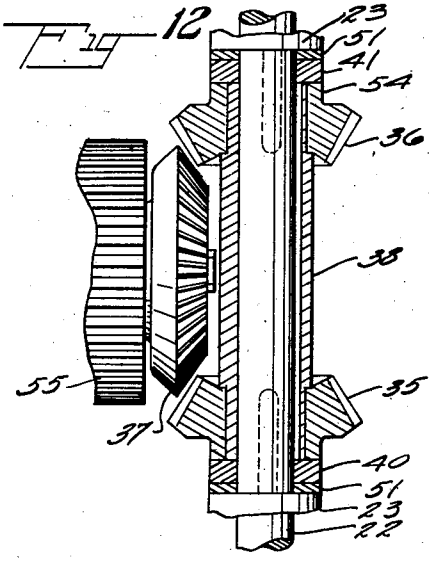
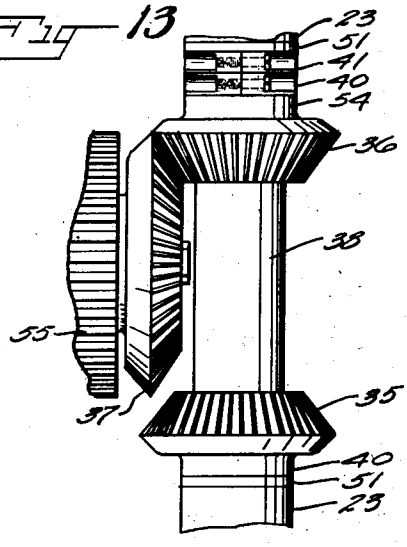


Fig 13



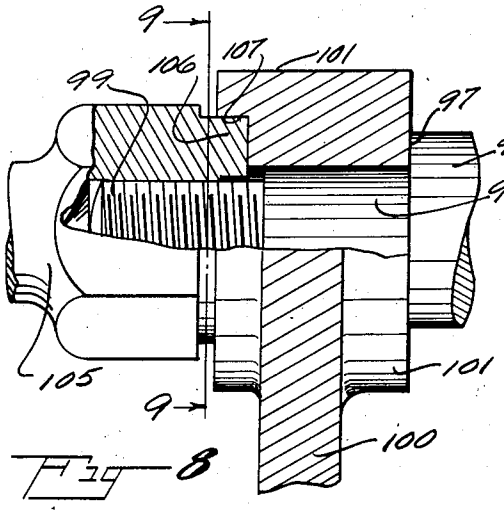


Fig 8

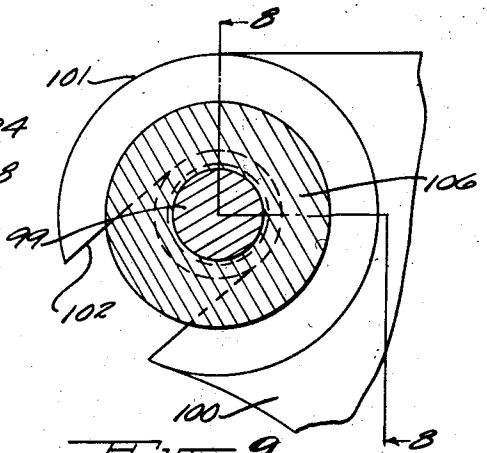


Fig 9

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Patented Aug. 30, 1927. 1,640,976

UNITED STATES PATENT OFFICE.

MARTIN W. BRUESHABER, OF CHICAGO, ILLINOIS, ASSIGNOR TO GOSS PRINTING PRESS COMPANY, A CORPORATION OF ILLINOIS.

PRINTING PRESS.

Application filed January 16, 1923. Serial No. 612,947.

The invention relates to rotary printing presses and more especially to novel driving mechanism therefor in connection with means for throwing off the form cylinder to render the parts quickly and easily accessible for overlaying and for other purposes.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations, and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:—

Fig. 1 is a fragmentary side elevation, largely diagrammatic, of one form or arrangement of printing press embodying the invention, or to which it may be applied (many parts of the invention being omitted from this view for the sake of clearness);

Fig. 2 is a fragmentary detail elevation of a printing couple with the drive on the impression cylinder shaft, and a cooperating throw-off mechanism on the form cylinder;

Fig. 3 is a view of the same mechanism looking at Fig. 2 from the right;

Fig. 4 is a fragmentary elevation, diminished in size, showing both sides of the throw-off mechanism which is shown in part in Fig. 3;

Fig. 5 is an enlarged fragmentary elevation, more or less diagrammatic in character, illustrating the operation of the throw-off mechanism for the form cylinder, and parts of the mechanism being the same as are shown at the right-hand part of Fig. 2;

Fig. 6 is a fragmentary vertical section, greatly enlarged, taken on the line 6—6 of Fig. 2;

Fig. 7 is a vertical section taken on the line 7—7 of Fig. 6;

Fig. 8 is a greatly enlarged fragmentary detail, partly in section, of the clamping or locking device for the throw-off lever shown at the lower left-hand part of Fig. 3, and is taken substantially on the line 8—8 of Fig. 9;

Fig. 9 is a vertical section, taken on the line 9—9 of Fig. 8;

Fig. 10 is a frgamentary elevation looking at Fig. 2 from the left;

Fig. 11 is an enlarged, horizontal, sectional view taken on the line 11—11 of Fig. 2;

Fig. 12 is a fragmentary detail, partly in elevation and partly in vertical section, showing the mechanism at the right-hand central part of Fig. 10, but with the drive for the impression cylinder in neutral position;

Fig. 13 is a fragmentary detail in elevation of the same parts as Fig. 12, but showing the cylinder driven in the opposite direction from Fig. 10; and

Fig. 14 is a fragmentary enlarged section on line 14—14 of Fig. 2.

The invention has for its primary object driving the cylinders of a printing couple in such manner and by such mechanism as to permit overlaying, and changes in overlaying, blanket adjustments, or other operations on the impression cylinder, without removing or otherwise disturbing the plates on the form cylinder, and without disconnecting the drive. This is exceedingly valuable, especially when running illustrations with letter press, and particularly so when doing multicolor work, as it obviates the necessity for removing plates and saves the consequent time and labor spent in securing registry. Other advantages from such an arrangement will be obvious to those skilled in the art without specific enumeration.

In the present preferred manner and embodiment for securing these results, the drive is placed on the impression cylinder, and cooperating with this drive, means are provided for throwing off, or moving away from impression, the form cylinder, thus giving access to the impression cylinder for overlaying or other purposes.

In connection therewith there is preferably, though not necessarily, provided an improved form of reversible drive for the printing couple, that is, for driving the cylinders optionally in either direction, as desired, as is frequently desirable or neces-

sary in printing in different ways and arrangements, as for instance, in perfecting in one color, or printing in multicolor on one side of the web.

Other features of the invention are directed to securing quick, easy and very accurate relation between a plurality of plate cylinders in the press, by variably angularly positioning any plate cylinder so as to effect accurate registry between the impressions from the plates on successive form cylinders printing on the same side of the web.

Other features of the invention will be initially pointed out in connection with the following detailed description of the present preferred embodiment of the invention; and it will be understood that the foregoing general description and the following detailed description are both exemplary and explanatory but not restrictive of the invention.

In the exemplary embodiment shown in the accompanying drawings, the invention is illustrated as applied to a multiple rotary press, adapted to print upon running webs in either one color or in a plurality of colors. The printed webs are run optionally in various ways through a single folding mechanism, or through a plurality of folding mechanisms, to secure various products as desired. The general arrangement of the press, the folders and the like and the various ways of operating them, are old and well-known, and it will be understood that the feaures of the present invention may also be applied to, or embodied in, rotary printing presses of other kinds, constructions and arrangements.

Referring more in detail to Fig. 1, a plurality of printing couples is shown, each couple having an impression cylinder 1 and a form cylinder 2, journaled in the press frame, their respective shafts being shown as 3 and 4 and the bearings therefor as 5 and 6, respectively.

Each cylinder is provided with an inking mechanism, shown only diagrammatically and indicated generally by the reference numeral 7. Each inking mechanism is movable to and from its form cylinder in a well-known manner, and in certain of the printing couples or units, the inking mechanism is shown in inking relation with the form cylinder, and in the other units is shown moved back therefrom. This gives free access to both the form cylinder and the inking mechanism for removing the plates, cleaning the ink rolls and any other desired or necessary purpose, the foregoing being a common arrangement of these mechanisms.

The printing couples are further shown arranged in a common and well-known manner, that is, with a plurality of printing couples arranged in decks, one above another, in the frame, and with a plurality of such groups or arrangements positioned longitudinally, one after the other, in the frame. The press illustrated in Fig. 1 has four such decks.

At the right-hand of Fig. 1, a usual or standard form of folding mechanism is shown, having longitudinal folders 15, 16, 17 and 18 and transverse folders 19 and 20, the printed webs being directed thereto, in various desired ways, over a plurality of turning bars indicated generally by numeral 21.

With the particular standard construction of press shown, there is conveniently provided a single or general drive for each vertically arranged and superposed group of printing couples or printing units, and in the embodied form a driving shaft 22 is vertically arranged along the ends of, and in alinement with, the shafts of the impression cylinders of these vertically arranged and superposed printing units. The shaft 22 is shown supplied with a plurality of bearings 23, and has driving connection with the shaft of each of the impression cylinders of the various printing couples, which will be described in detail at a later point herein. The various vertically disposed driving shafts 22 are themselves driven in a suitable manner by mechanism indicated diagrammatically and identified by reference numeral 24, and which need not be described in detail.

As previously stated, the main feature of the invention, namely, the driving of the printing couple through the shaft of the impression cylinder and providing therewith means for slightly throwing off the form cylinder to permit overlaying, changes in the overlay, blanket adjustments, and the like, without disturbing the registry of the plate on the form cylinder, is preferably combined or is embodied in cooperation with a reversible drive for the printing couple.

As embodied (Figs. 2, 10, 12 and 13), on the shaft 22, for each printing couple, are a pair of beveled gears 35 and 36, movable into and out of mesh with a bevel gear 37, fixed on the end of the shaft 3 of the impression cylinder 1, the two gears 35 and 36 being in opposite diametral relation to the gear 37 as is usual in reversible gear drives of this kind.

Encircling shaft 22 between the gears 35 and 36 is a spacing sleeve 38, which maintains these bevel gears at such distance apart as to permit the necessary movement along the shaft, so that either gear wheel may mesh with the gear 37 or both be maintained in neutral position, as shown in Fig. 12. The gears are preferably mounted on diminished ends of the sleeve, the gears being keyed to the sleeve and the sleeve having a feather

or spline connection with the shaft to rotate therewith while being slidable therealong.

The embodied form of positioning or controlling means for this reversible drive mechanism for the impression cylinder, comprises two split rings 40 and 41, the general construction of which will be best seen from Figs. 2, 10 and 11. Each ring is provided with a pivot connection 42 between the two halves of the ring, and diametrally opposite therefrom in the ends of the ring are a pair of recesses 43 and 44 forming radially disposed flanges 45 and 46 at the ends of the ring, which abut on each other when the ring is closed about the shaft, and are locked together by a screw bolt 47. A key 48 is set in the shaft 22, and is received in a notch or recess 49 in the ring to prevent rotary slippage of the ring on the shaft.

When both rings 40 and 41 are beneath the hub 50 of gear 35 that bevel gear is in mesh with the impression cylinder bevel gear 37, and the lowermost ring rests upon the bearing 23 therebeneath. Friction washers 51 are preferably provided and are shown between the lower ring and the bearing. In this position spacing sleeve 38 holds gear 36 clear from gear 37, as will be seen from Fig. 10.

When it is desired to have both bevel gears 35 and 36 in neutral or non-driving position, as when a particular printing couple or printing unit is silenced and other couples or units on the same shaft 22 are to be driven, collar 41 is removed from beneath the hub 50 of the bevel gear 35, and is placed about shaft 22 above hub 54 of gear 36, and gear 35, now resting on ring 40, is thus dropped out of mesh with gear 37. Sleeve 38 also maintains gear 36 out of mesh with gear 37. When the impression cylinder is to be rotated in the opposite direction, the other split ring 40 is removed from about shaft 22 beneath gear 35 and is placed about the shaft above gear 36, as shown in Fig. 13.

The form cylinder is driven from the impression cylinder preferably by a pair of intermeshing spur gears, one gear 55 being fixed on the shaft 3 of the impression cylinder 1, and the intermeshing spur gear 56 being fixed upon the shaft 6 of the plate cylinder 2. This latter gear wheel has applied thereto, or cooperates with, certain mechanism, previously generally referred to and later to be described in detail, for effecting exact angular registry between the plates on the form cylinders of different printing couples or printing units.

Referring now in detail to the illustrated exemplary embodiment of the means for throwing off, or moving the plate cylinder away from impression, shaft 4 (Figs. 5, 6 and 7) is journaled in an eccentric bushing 65, which bushing is fixed to a cylindrical sleeve 66, which sleeve is journaled in the frame 67 of the machine. Sleeve 66 has its central cylindrical opening eccentric to its outer cylindrical surface. Bushing 65 is angularly adjusted or positioned within sleeve 66, and is fixed thereto in any suitable manner. As shown, a flat, annular flange 68 is formed on the outer end of the bushing and overlies and contacts with the flat annular outer face of the sleeve. Countersunk screws 70 pass through the bushing flange and into the sleeve to hold them in fixed relation.

Sleeve 66 is rotatable or oscillable through a relatively small angle to move the form cylinder toward or away from the impression cylinder. As embodied, on the external end of sleeve 66, and projecting radially therefrom, is a flat plate 74 in contact with a finished surface on the exterior face of the machine frame member 67. Integral with plate 74 is an outwardly projecting arm 75. Pivoted at 76 to the outer end of arm 75 is a rod 77, which rod at its other end 78 is pivoted to a yoked arm 79, fixed on a shaft 80. The mechanism just described is duplicated for each of the two bearings of the shaft of the plate cylinder, as will be clear from Fig. 4, the shaft 80 extending across the press and being journaled at 81 and 82 in the two side frames 67 and 83 of the press. It will be understood also that much of the mechanism later described is duplicated in like manner at each end of the form cylinder, only one mechanism being described as a matter of convenience.

Means are provided in connection with the foregoing mechanism for regulating the movement and position of the form cylinder so as to bring it exactly and nicely to impression position with the respective pairs of bearer rings on the cylinders in proper contact with each other. The embodied form of such means comprises a device for varying the length of rod 77. For this purpose the rod is separated into two parts near its middle, the adjacent ends being screw-threaded into an internally screw-threaded sleeve or turn-buckle 90, which is oppositely threaded to receive the two ends of rod 77. Sleeve 90 is preferably provided at its respective ends with lock nuts 91 and 92. Thus by lengthening or shortening the rod 77 by means of the sleeve 90, the impression position of the plate cylinder may be determined and regulated with any desired degree of exactness.

Cooperating with this mechanism is an arcuate slot 88 formed in plate 74, and projecting through the slot and screw-threaded into the press frame is a screw bolt 89, this device serving as a guiding and locking device.

In the embodied form of operating means for the throw-off mechanism just described, a hand lever 93 is fixed to one end of the

shaft 80 and this lever is preferably provided with means for locking it when the form cylinder is in printing relation with the impression cylinder (Figs. 2, 3, 8 and 9). As embodied, a rod 94 has its inner end 95 screw-threaded into the machine frame member 67, a collar 96 on the rod abutting on the external face of the frame member.

At its external end rod 94 is provided with a shoulder 97, and has a reduced concentric portion 98 extending outwardly therefrom. From the outer end of the part 98 there extends a concentric reduced and externally screw-threaded portion 99. The lever 93 has fixed to or integral therewith an outwardly extending flat arm 100, and has a hub 101 formed thereon, the hub having an aperture 102 therein, adapted to fit closely over the part 98 of the rod 97.

A clamping screw 105 is internally screw-threaded, and has at its inner end a reduced cylindrical portion 106 fitting within an annularly recessed portion 107 in the outer end of hub 101. The flat annular faces of the hub within the recess and of the inner face of the part 106 of the clamping screw bear upon each other with locking pressure, when the screw is turned home, as best appears from Fig. 8, the proportions and clearances of the various parts being designed for this purpose, as will be clearly seen from Fig. 8.

The screw bolt 89 is loose during the movement of the form cylinder, but at impression position is screwed home to firmly lock the parts in printing position. Thus the plate cylinder is firmly locked in impression or printing position. In Fig. 5 this mechanism is shown in full line for the printing position and in broken line for the throw-off position for the plate cylinder. In this view *a* is the center of rotation of sleeve 66 and arrow *b* represents the path of the axis of the form cylinder 2. It will be understood that this particular representation is explanatory only and not restrictive as to particular form, proportion of parts or other details.

Referring now to the embodied form of means for securing angular registry between the form cylinders of different printing couples (Figs. 2, 3, 4, 6 and 14), gear wheel 56 has its gear teeth angularly adjustable relatively to its hub. For this purpose, the rim 115 has an inwardly projecting annular plate 116 contacting on the side face of a similar plate 117 integral with the hub 118, the hub being fixed to the shaft 4 by key 119. The outer annular periphery 120 of the plate 17 fits within the inner face of the ring 115 of the gear wheel. The plate 116 is provided with a plurality of arcuate slots 124 through which project screw-bolts 125 which are screw-threaded into the plate 117. A pin or post 130 is fixed to the outer face of plate 117 and projects through a slot 131 in plate 116. A similar pin or post 132 is fixed and projects from the face of plate 116. Each post has an internally screw-threaded aperture therein and a rod 133 is screw-threaded at each end into the apertures. Rod 133 is provided centrally with a turning part 134.

By turning rod 133 a very fine and exact angular adjustment is effected between form cylinder 2 and gear wheel 56. When the adjustment or positioning is effected, screw bolts 125 are screwed home to lock the cylinder and gear wheel in position. Hub 118 has an enlarged head 136 provided with holes 137 for a turning bar whereby the cylinders may be turned by an attendant any short distance as desired without the use of power.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. A printing press including in combination a printing couple comprising a form cylinder and an impression cylinder, a reversible driving mechanism on the impression cylinder including spacing means for locking said driving mechanism in forward, reversing and neutral positions, and means for moving the form cylinder away from impression.

2. A printing press including, in combination, a printing couple comprising a form cylinder and an impression cylinder, a reversible driving mechanism on the impression cylinder including spacing clamping collars for locking said driving mechanism in forward, reversing and neutral positions.

3. A printing press including in combination a printing couple comprising a form cylinder and an impression cylinder, a reversible driving mechanism on the impression cylinder including spacing means for locking said driving mechanism in forward, reversing and neutral positions, means for locking said spacing means, means for moving the form cylinder away from impression, and inking means movable to and from the form cylinder.

4. A printing press including, in combination, a printing couple comprising a form cylinder and an impression cylinder, driving means for the impression cylinder including a bevel gear for driving the impression cylinder, and a plurality of bevel gears engageable with the first bevel gear for driving it in opposite directions, means connecting said plurality of bevel gears whereby they are shifted in unison, and clamping means for locking said plurality of bevel

gears in position to drive said impression cylinder in either direction.

5. A printing press including, in combination, a printing couple comprising a form cylinder and an impression cylinder, driving means for the impression cylinder including a bevel gear for driving the impression cylinder, and a plurality of bevel gears engageable with the first bevel gear for driving it in opposite directions, clamping means for locking one of said plurality of bevel gears in position and thereby locking the other in predetermined position to drive said impression cylinder in either direction, and means operated by an attendant for moving the form cylinder away from impression.

6. A printing press including in combination a printing couple comprising a form cylinder and an impression cylinder, driving means including a pair of bevel gears mounted in relatively fixed relation and an alternatively cooperating bevel gear on the impression cylinder, means for moving the form cylinder away from impression, and inking means movable to and from the form cylinder.

7. A printing press including in combination a printing couple comprising a form cylinder and an impression cylinder, and a reversible drive comprising a gear on a cylinder shaft, a driving shaft having two gears, one on either side of the cylinder shaft gear, and slidable along the driving shaft but turning therewith, and split rings adapted to encircle the shaft and removable and insertible to bring either gear alternatively into driving relation with the gear on the cylinder shaft or to hold both gears in non-driving position.

8. A printing press including in combination a printing couple comprising a form cylinder and an impression cylinder, and a reversible drive comprising a gear on a cylinder shaft, a driving shaft having two gears, one on either side of the cylinder shaft gear, and slidable along the driving shaft but turning therewith, and split rings adapted to encircle the shaft and removable and insertible to bring either gear alternatively into driving relation with the gear on the cylinder shaft.

9. A printing press including in combination a printing couple comprising a form cylinder and an impression cylinder, means for moving the form cylinder away from impression, and a reversible drive for the impression cylinder comprising a pair of bevel gears, and a sleeve on which the bevel gears are mounted in spaced relation.

10. A printing press including in combination a printing couple comprising a form cylinder and an impression cylinder, means for moving the form cylinder away form impression, and a reversible drive for the impression cylinder comprising a pair of bevel gears, and means for mounting the bevel gears in spaced and relatively fixed relation, comprising a movable sleeve to which both bevel gears are secured so as to rotate therewith.

11. A printing press including in combination a printing couple comprising an impression cylinder having a shaft, fixed bearings for the impression cylinder, a form cylinder, a reversible drive cooperating with the impression cylinder shaft, and comprising gear wheels connected to rotate together to be moved simultaneously to alternatively drive the couple in different directions, and clamping means for locking said gear wheels in driving position.

12. A printing press including, in combination, a printing couple comprising a form cylinder and an impression cylinder, a reversible drive therefor comprising reversely diving gears, and clamping positioning collars for locking said gears in neutral and in forward and reverse driving positions.

13. A printing press including in combination a rotary printing couple, driving means therefor including a shaft, and two driving gears rotating with the shaft and slidable therealong in fixed relation, whereby one gear passes into and the other out of driving relation to the printing couple alternatively, to drive the couple in either direction.

14. A printing press including in combination a rotary printing couple, driving means therefor including a shaft, and two driving gears rotating with the shaft and slidable therealong in fixed relation, whereby one gear passes into and the other out of driving relation to the printing couple alternately to drive the couple in either direction or both gears may remain in non-driving position.

15. A printing press including in combination a rotary printing couple, driving means therefor including a shaft, and two driving gears rotating with the shaft and slidable therealong in fixed relation, and means for maintaining the driving gears in any one of three positions, to drive the couple in either direction or to leave it at rest.

16. A printing press including in combination a rotary printing couple, a driven gear wheel on one of the shafts of the couple, and driving means for the gear including a driving shaft and two gears rotating with, but slidable along, the shaft and on opposite sides of the driven gear, and connections between the driving gears whereby they may be slid along the shaft to alternatively drive the driven gear in either direction.

17. A printing press including in combination a rotary printing couple, a driven gear wheel on one of the shafts of the couple, and driving means for the gear including a

driving shaft and two gears rotating with, but slidable along, the shaft and on opposite sides of the driven gear, and connections between the driving gears whereby they may be slid along the shaft to alternatively drive the driven gear in either direction, or said driving gears may remain in an intermediate non-driving position.

18. A printing press including in combination a rotary printing couple, a driven gear wheel on one of the shafts of the couple, and driving means for the gear including a driving shaft and two gears rotating with, but slidable along, the shaft and on opposite sides of the driven gear, and connections between the driving gears whereby they may be slid along the shaft to alternatively drive the driven gear in either direction, and means for maintaining them in either of said positions.

19. A printing press including in combination a rotary printing couple, a driven gear wheel on one of the shafts of the couple, and driving means for the gear including a driving shaft and two gears rotating with, but slidable along, the shaft and on opposite sides of the driven gear, and connections between the driving gears whereby they may be slid along the shaft to alternatively drive the driven gear in either direction, or said driving gears may remain in an intermediate non-driving position and means for maintaining them in any of said positions.

20. A printing press including in combination a plurality of printing couples positioned in alined relation, and independently reversible driving means for the various couples including a common driving shaft extending past the various couples, and a pair of driving gears on the shaft for each printing couple, and means whereby each pair may be moved along the shaft independently of the other pairs, and with the gears of the pair in fixed relation so as to alternatively drive their printing couple in either direction.

21. A printing press including in combination a plurality of printing couples positioned in alined relation, a driven gear on a shaft of each printing couple, and independently reversible driving means for the various printing couples, including a common driving shaft extending past the various couples, and a pair of driving gears on the shaft for each printing couple and located on opposite sides of its driven gear, and means whereby any pair of driving gears may be moved along the shaft independently of the other pairs, to bring the two gears of the pair alternatively into mesh with the driven gear.

22. A printing press including in combination a plurality of printing couples positioned in alined relation, a driven gear on a shaft of each printing couple, and independently reversible driving means for the various printing couples, including a common driving shaft extending past the various couples, and a pair of driving gears on the shaft for each printing couple and located on opposite sides of its driven gear, and means whereby any pair of driving gears may be moved along the shaft independently of the other pairs, to bring the two gears of the pair alternatively into mesh with the driven gear or to both remain out of mesh with the driven gear.

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

MARTIN W. BRUESHABER.