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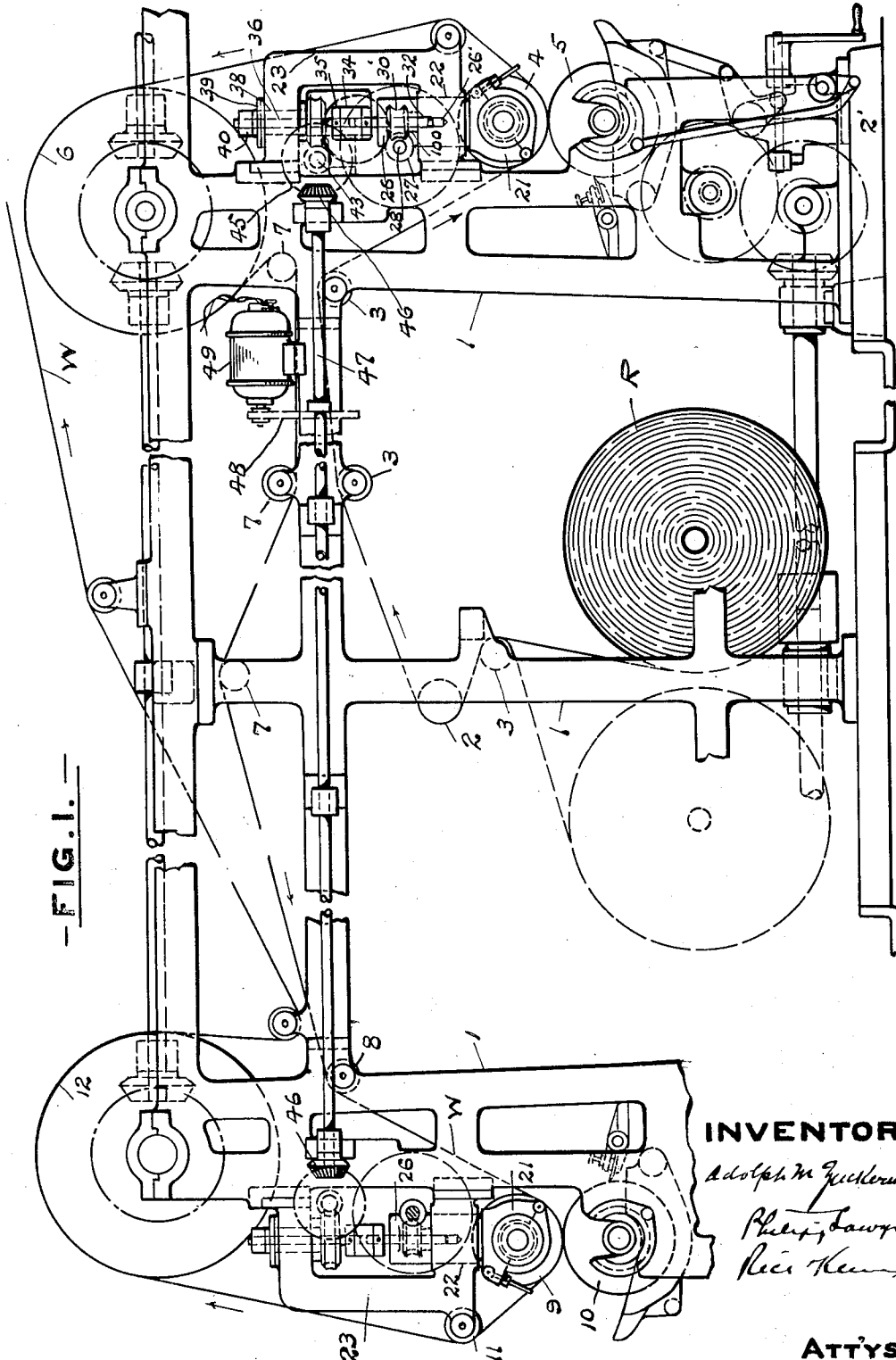
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A. M. ZUCKERMAN

INTAGLIO PRINTING MACHINE

Filed Aug. 27, 1925

3 Sheets-Sheet 1



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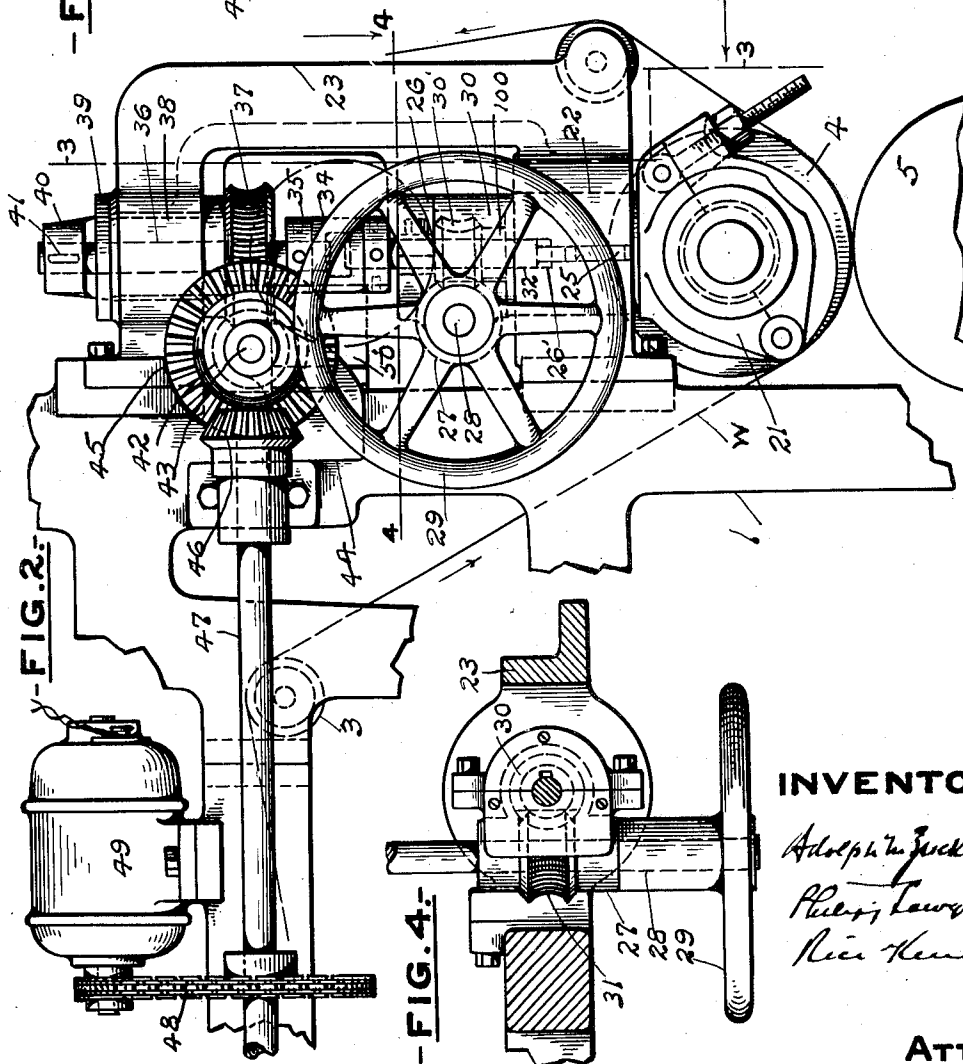
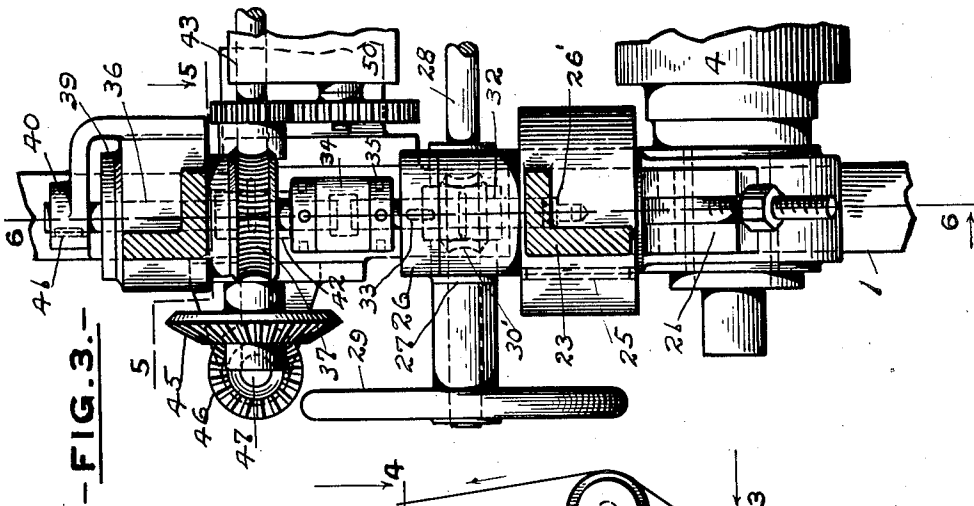
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3 Sheets-Sheet 2



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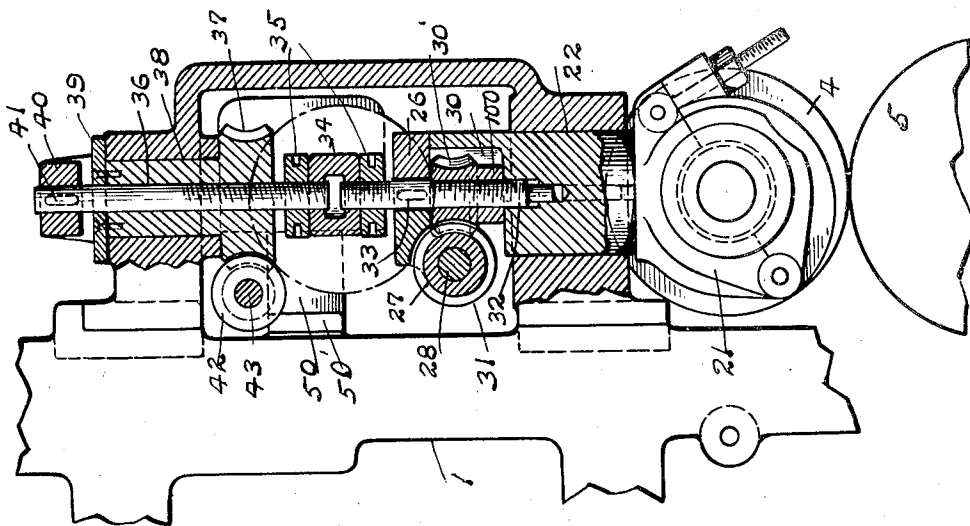
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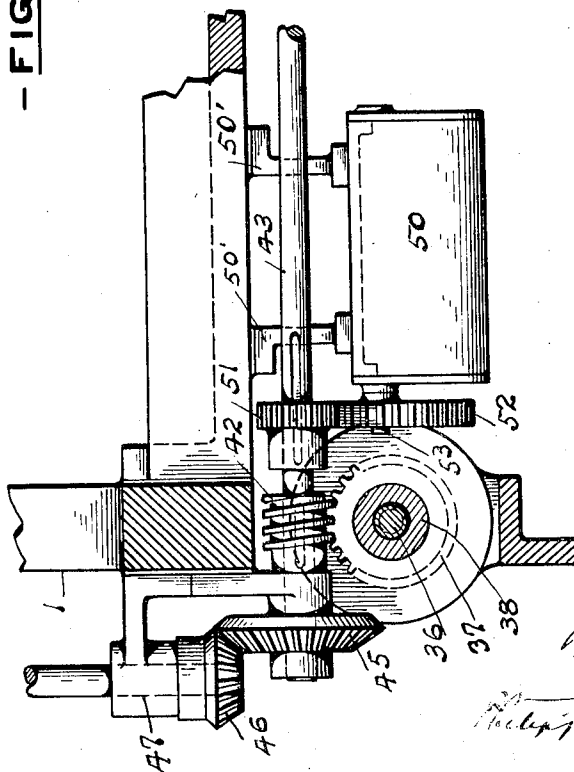
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3 Sheets-Sheet 3



- FIG. 6.-



- FIG. 5.-

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UNITED STATES PATENT OFFICE.

ADOLPH M. ZUCKERMAN, OF NEW YORK, N. Y., ASSIGNOR TO R. HOE & CO., INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

INTAGLIO PRINTING MACHINE.

Application filed August 27, 1925. Serial No. 52,737.

This invention relates to certain improvements in intaglio or the like printing machines.

In this type of machine the printing is effected from engraved or etched forms, these forms being usually copper cylinders. Co-operating impression means, also used with these cylinders, are provided. In this class of printing great care must be taken to have the impression contact between the form and impression cylinders regulated with a degree of fineness required to get the products desired. In these machines it is often necessary to separate the cylinders to stop the printing relation of the couples. After the movable members of the couple have been moved back to resume printing contact between the cylinders it is necessary that these cylinders be brought to the position they occupied before their separation. In this type of machine, furthermore, it is desirable, where a plurality of couples are used, that certain adjustment of the couples may be effected simultaneously or the couples may be separately adjusted. It is also desirable, in this type of machine, that the impression may be varied on two ends of one of the cylinders of each couple as, where, as usually is the case, the impression cylinder is rubber-blanketed, it is difficult to get the same pressure throughout the length of the cylinder so that there is more impression contact on one end of the cylinder than on the other.

It is one object of the present invention to provide a machine of this type in which the cylinders of a plurality of printing couples may be given a simultaneous adjusting movement, or one end of one of the cylinders of any one couple may be adjusted relatively to the other end to make up for any variance in the thickness of a blanket or for any other reason so as to get a uniform pressure across the cylinders of the couple.

It is a further object of the invention to provide a construction in which the cylinders are mounted in rigid, unyielding parts without the use of springs, so that the required impression contact having been once adjusted will remain so for any particular run.

It is a further object of the invention to construct and arrange the parts so that there is little wear or tear caused by the adjusting movements in which a simple and strong construction is provided.

With these and other objects not speci-

cally referred to in view, the invention consists in certain novel parts, arrangements and combinations which will be described in connection with the accompanying drawings and the novel features pointed out in the claims hereunto annexed.

Referring to the drawings—

Figure 1 is a side elevation of so much of an intaglio printing machine as is necessary for an understanding of the invention;

Figure 2 is an enlarged view, partly broken away, of certain of the parts shown in Figure 1;

Figure 3 is a side view of Figure 2, the view being partly in section, taken on the line 3—3 of Figure 2 looking in the direction of the arrow 3 of that figure;

Figure 4 is a detail sectional plan, the section being taken on line 4—4 of Figure 2, looking in the direction of arrow 4 of that figure;

Figure 5 is a plan view, partly in section, the view being taken on line 5—5 of Figure 3, looking in the direction of arrow 5 of that figure; and

Figure 6 is a vertical sectional view, the section being taken on line 6—6 of Figure 3.

Referring now to these drawings, the machine selected to illustrate the invention is a rotary intaglio web perfecting machine having two printing couples in which the form cylinders are below and the impression cylinders above, but it will be understood that the invention is applicable to as many couples as there are in the machine and the invention is therefore not to be restricted to the machine illustrated.

Referring to the machine shown, one side only of the machine is illustrated, it being understood that certain of the parts are duplicated on the other side of the machine. They are not shown as being unnecessary to an understanding of the invention. As illustrated, the various parts of the mechanism are carried in side frames 1 of any usual or desired construction, these side frames being supported on bases 2'. The particular machine shown prints from a web W, supplied from a web roll marked R. This web passes over the usual guide rolls 3, tension roll 2, to and between the impression cylinder 4 and form cylinder 5 of one of the printing couples, over a drying roll 6, guide rolls 7, tension roll 8, to and between the impression cylinder 9 and the

form cylinder 10 of the perfecting couple, passing from this couple over a guide roll 11 and a drying roll 12 to any suitable delivery, not shown.

5 The printing couples and the adjusting mechanism, therefore, are the same in construction, and the description of one will suffice for both. In the particular machine illustrated, the impression cylinders are
10 arranged above the form cylinders and these impression cylinders are moved to effect the required adjustment. In the particular construction shown, the impression cylinders are carried in bearings 21. The bearings are
15 formed with a circular extension 22 and have a straight line, vertical movement in an opening bored in a carrier frame 23 secured to the main press frame 1, before referred to, this bearing being prevented
20 from rotating in the frame by means of a key or feather 25 (see dotted lines in Figure 3).

In accordance with the invention, means are provided for simultaneously adjusting
25 both impression cylinders for raising or lowering the bearings of each cylinder independently of the other, and for raising or lowering each bearing of each cylinder independently of the other bearing so as to effect
30 an adjustment widthwise of each cylinder. While these means may vary somewhat, in the best construction the bearing adjusting mechanism will be unyielding, that is, will be rigid without springs so that when once
35 adjusted it will remain in adjusted position throughout the run.

While the specific construction for effecting this may be somewhat varied, in the particular construction shown the top of the
10 extension 22 has secured thereto a cap 26 which is provided with a bearing 27 for a shaft 28 extending across the machine and provided with a hand wheel 29. The upper
15 part of the cylindrical extension 22 is formed with a recess 30 in which is mounted a worm wheel 30' which meshes with a worm 31 on the shaft 28, before referred to. This
20 worm wheel is threaded and travels on a screw rod 32 which has a sliding movement in the cylindrical extension 22 and in the cap
25 26, a recess 26' being provided in the cylindrical extension 22 in which the screw rod can have this vertical sliding movement. To
30 eliminate, as far as possible, wear in the parts, this screw rod does not turn, being
35 prevented from rotating by a feather or key 33 (see Fig. 3) in the cap 26, before referred to.

It will be observed that by the manipulation of the hand wheel 29 through the shaft
40 28 the impression cylinder may be adjusted relatively to the form cylinder, the rotation of the worm 28 rotating the worm 30' and causing it to ride up or down the screw, the gear abutting against the under side of

the cap 26 and lifting the bearing on the upward movement, and bearing against a block 100 seated on the cylindrical bearing 32 in the recess 30, before referred to.

In machines constructed in accordance
70 with the best practice, means will be provided for permitting an adjustment of one end of an impression cylinder relatively to the other end so that the pressure exerted by the impression cylinder on the form
75 cylinder may be varied widthwise of the cylinder and, in the best construction, means will also be provided whereby the impression cylinders of all the printing couples may be
80 adjusted. While these means may be somewhat varied, in the particular construction illustrated, the upper end of the screw rod 32 is secured to a turn buckle 34, the screw
85 being connected with the turn buckle so as to be moved vertically thereby by means of a jam nut 35. It will be seen that by turning this turn buckle the screw 32 is given a vertical
90 movement and the screw being threaded to the worm 30' acts through it to raise or lower the cylindrical bearing 22, this adjustment being independent at each end of the
95 cylinder so that a required degree of pressure may be exerted at either end of the cylinder independently of the other end.

The means for effecting the simultaneous
95 adjustment of all the impression cylinders may be of any desired character. Where, in the present instance, a turn buckle is employed for permitting the cylinder adjustment just described, this turn buckle may be
100 used as part of the connections. As shown, the turn buckle has secured to it at the end opposite the screw 32 a second threaded screw 36, this screw 36 being secured in the
105 turn buckle by another jam nut 35. This threaded screw 36 has threaded thereon a worm wheel 37 having a hub 38 which passes through a hole in the upper part of the frame 23, before referred to, and this hub is
110 prevented from any movement, except a rotary one, by a cap or flange 39 secured thereto and to the frame, so that it is held in position. The upper end of the screw rod 36
115 passes through a bracket 40 suitably secured to the frame 23 and is prevented from rotating by a feather 41 in the bracket cooperating with the groove in the screw.

Worm wheel 37 is in mesh with a worm
120 42 carried on a shaft 43 connecting the front and rear parts of the machine. This shaft is supported in brackets 44 secured to the main framing 1 of the machine. Secured to
125 one end of the shaft 43 is a bevel gear 45 which meshes with a bevel gear 46 on a cross shaft 47. This cross shaft 47, as shown in Figure 1, extends along and connects all the
130 units of the press, being provided with the required number of bevel gears 46 to accommodate as many units as may be employed in a press. In the best constructions, after

the shaft 47 has been operated to simultaneously raise the impression cylinders of all the couples, means will be provided whereby it can be operated to return the impression cylinders of the couples to the exact position they occupied before they were separated from the cooperating form cylinders.

While the particular construction for effecting this may be varied, in the particular construction shown the shaft is driven by a chain 48 from a motor 49 suitably mounted in one of the frames 1 of the machine. This motor is connected to a limit switch, not shown, which is carried in the housing 50 supported from brackets 50' depending from one of the machine frames 1, as shown in Fig. 5, this limit switch, in the usual construction, acting to cut out the motor and stop the rotation of the shaft 47 when the parts have reached the desired position. This limit switch may be operated in any suitable way. In the particular construction shown, it is operated from one of the shafts 43 by means of a pair of spur gears 51, 52, one of which is on the shaft 43 and the other of which is connected to a threaded rod 53 carrying the movable member of the limit switch by which the switch is operated at the desired times.

With this construction it will be seen that the impression cylinders of all the couples may be simultaneously adjusted or the impression cylinders may be individually or independently adjusted, and each end of each impression cylinder may be adjusted. Furthermore, springs which are unsatisfactory, are omitted from the construction and the connections are unyielding so that a strong, rigid construction is provided in which the parts remain set in their adjusted position.

While the invention has been shown and described in the preferred form and one in which the impression cylinders are movable, it will be understood that it can be employed in constructions in which the form cylinders are moved and changes and variations in the specific structure shown for adjusting the parts may be made without departing from the invention as defined in the appended claims.

What is claimed is:

1. In a printing machine, the combination of a plurality of printing couples each including an impression cylinder and a cooperating form cylinder vertically arranged, one of which is movable relatively to the other, means including screw rods for simultaneously adjusting the movable cylinders, means including second screw rods for independently adjusting the movable cylinders, and unyielding rigid connections between said means and the cylinders that are adjusted thereby.

2. In a printing machine, the combination of a plurality of printing couples, each in-

cluding an impression cylinder and a cooperating form cylinder vertically arranged, one of which is movable relatively to the other, means including screw rods for adjusting the movable cylinders simultaneously, means including second screw rods for adjusting the movable cylinders independently of each other, means connecting each set of screw rods for adjusting either end of each of the movable cylinders relatively to its cooperating cylinder, and unyielding rigid connections between all said means and cylinders adjusted thereby.

3. In a printing machine, the combination of a plurality of printing couples, each including a form cylinder and an impression cylinder, movable bearings for one of the cylinders, screw rods for operating the movable bearings, gears threaded on the rods, operating gears engaging the rod gears for independently adjusting the bearings, second operating rods, connections between the operating rods of each set, gears threaded on the second operating rods, and driving gears cooperating therewith for simultaneously adjusting the movable bearings.

4. In a printing machine, the combination of a plurality of printing couples, each including a form cylinder and a cooperating impression cylinder movable relatively to each other, movable bearings for the movable cylinders, screw rods connected with the movable bearings and held from rotation with respect thereto, gears threaded on the rods, driving gears engaging the rod gears for independently adjusting the movable bearings, a second set of rods held against rotation, gears threaded on the second rods, driving gears engaging these rod gears, connections between the driving gears for simultaneously moving the bearings, and adjustable connections between the rods of each set for independently adjusting each end of the movable cylinder relatively to its cooperating cylinder.

5. In a printing machine, the combination of a plurality of printing couples, each including a form cylinder and a cooperating impression cylinder movable relatively to each other, movable bearings for one of the cylinders, screw rods connecting with the bearings, gears threaded on the rods, driving gears meshing with the rod gears for moving the bearings independently, a second set of screw rods, gears threaded on the rods, driving gears engaging the rod gears, a shaft connecting the driving gears of all the couples for simultaneously operating the rod gears, and a turn buckle connecting the two rods of each bearing and adjustable to raise or lower the bearing at either end of each of the movable cylinders.

6. In a printing machine, the combination of a plurality of printing couples, each including a form cylinder and a cooperat-

ing impression cylinder movable relatively to the form cylinder, a movable bearing for each impression cylinder having an extension, a screw rod slidable in the extension, a worm gear threaded on the rod, an abutment on the extension engaged by the worm, a gear engaging the worm, a shaft for the gear, a second screw rod, a gear threaded on the rod, a gear engaging said second rod gear, a shaft therefor, and connections between the screw rods.

7. In a printing machine, the combination of a plurality of printing couples each including a form cylinder and an impression cylinder movable relatively to the form cylinder, a movable bearing for each impression cylinder having an extension, a screw rod slidable in the extension, a worm gear threaded on the rod, an abutment on the extension engaged by the worm, a gear engaging the worm, a shaft for the gear, a second screw rod, a gear threaded on the rod, a gear engaging said second rod gear, a shaft therefor, means for preventing the rotation of the rods, and adjustable connections between the rods.

8. In a printing machine, the combination of a plurality of printing couples each including a form cylinder and a cooperating impression cylinder movable relatively to the form cylinder, a movable bearing for each impression cylinder having an extension, a screw rod slidable in the extension, a worm gear threaded on the rod, an abutment on the extension engaged by the worm, a gear engaging the worm, a shaft for the gear, a second screw rod, a gear threaded on the rod, a gear engaging said second rod gear, a shaft therefor, means for connecting said latter shafts whereby they may be operated simultaneously, and connections between the screw rods.

9. In a printing machine, the combina-

tion of a plurality of printing couples each including a form cylinder and a cooperating impression cylinder movable relatively thereto, a frame adjacent each movable cylinder, a bearing for each movable cylinder having an extension supported by the frame, a screw rod slidable in the extension, a worm gear threaded on the rod, an abutment on the extension engaged by the worm, a gear engaging the worm, a shaft for the gear carried by the extension, a second screw rod, a gear threaded on the rod, a gear engaging said second rod gear, a shaft therefor carried by the frame, and adjustable connections between the screw rods.

10. In a printing machine, the combination of a plurality of printing couples each including a form cylinder and a cooperating impression cylinder movable relatively to each other, movable bearings for one of the cylinders, screw rods connected with the bearings for adjusting them independently, second screw rods for adjusting the bearings simultaneously, and a rotary member connecting the two rods of each bearing and adjustable to raise or lower the bearing at either end of each of the movable cylinders.

11. In a printing machine, the combination of a plurality of printing couples each including a form cylinder and a cooperating impression cylinder movable relatively to each other, movable bearings for one of the cylinders, screw rods connected with the bearings for adjusting them independently, second screw rods for adjusting the bearings simultaneously, a coupling connecting the rods and a manually operable member connected with one of the screw rods.

In testimony whereof, I have hereunto set my hand.

ADOLPH M. ZUCKERMAN.