

Dec. 21, 1954

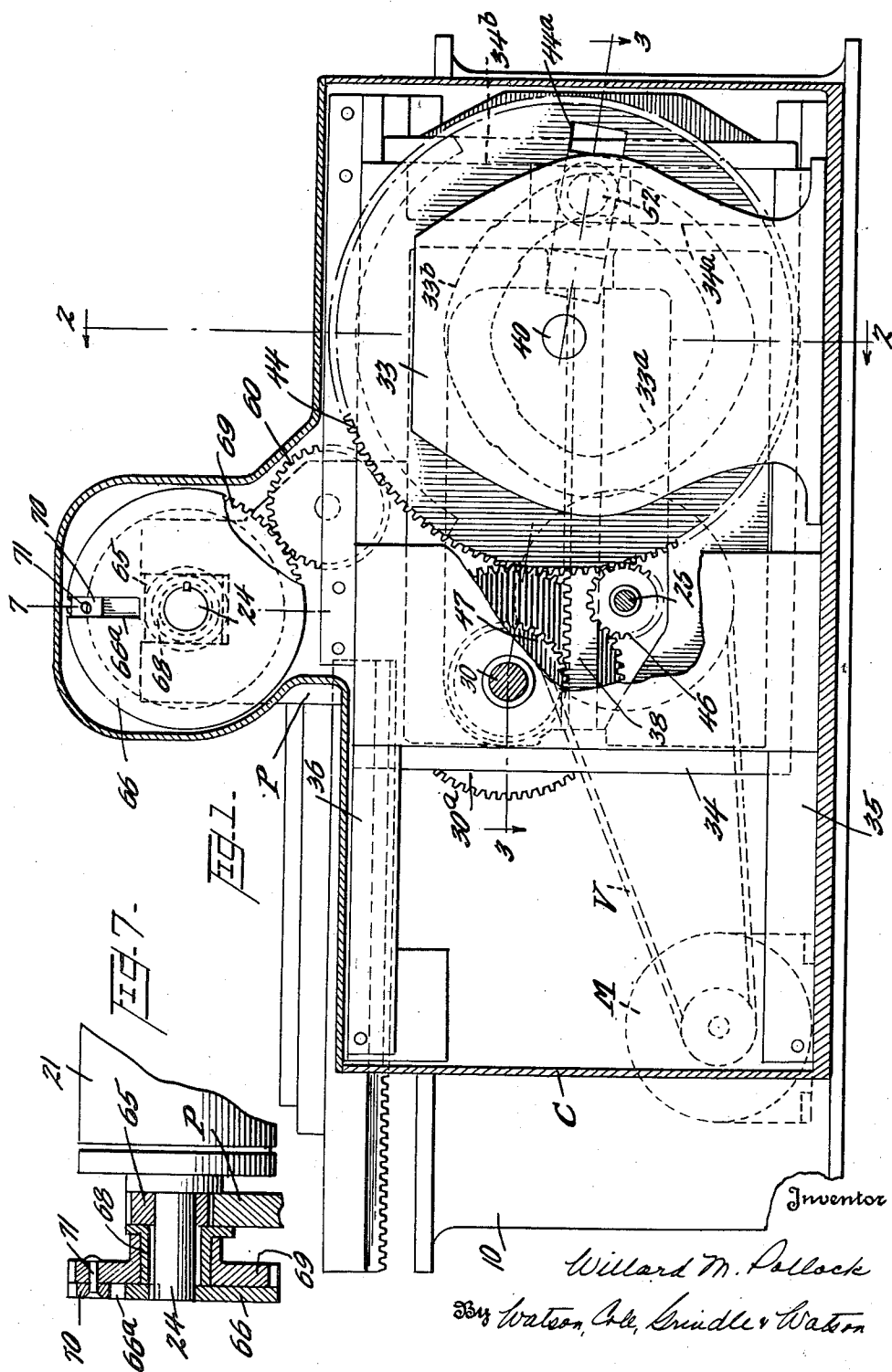
W. M. POLLOCK

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PRINTING PRESS DRIVE MEANS

Original Filed July 2, 1948

3 Sheets-Sheet 1



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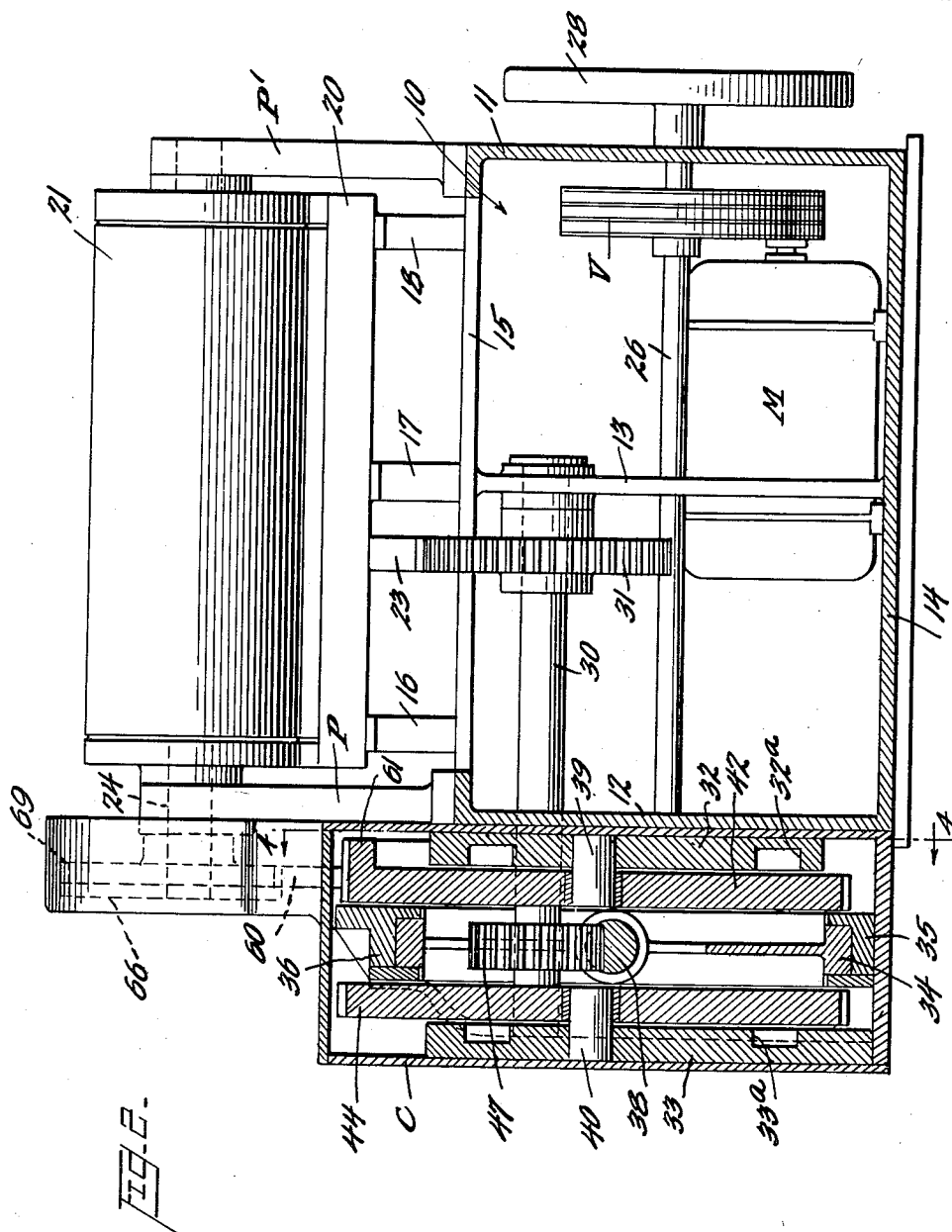
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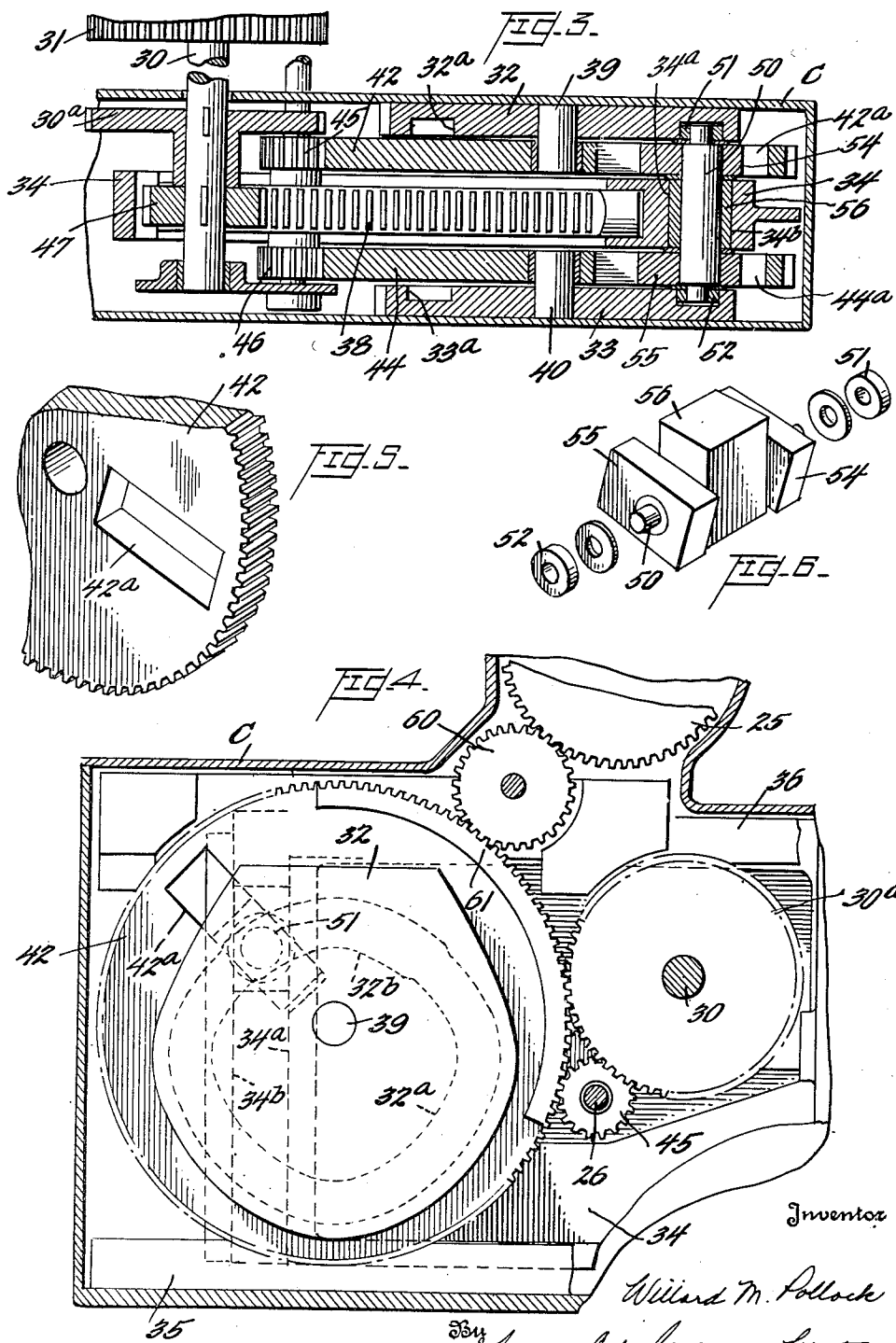
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2,697,398

PRINTING PRESS DRIVE MEANS

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Original application July 20, 1948, Serial No. 39,695. Divided and this application February 8, 1951, Serial No. 210,050

2 Claims. (Cl. 101—282)

This invention relates to printing presses of the bed and cylinder type and particularly to a press of this general class which is provided with mechanism for driving the bed at uniform velocity upon its printing stroke and returning the bed to starting position at a more rapid rate than that at which it moves when performing the actual printing operation.

In a press of this character heretofore successfully employed in printing the desired non-uniform movement of the bed of the press is obtained by means of a comparatively simple but nevertheless highly effective driving mechanism comprising essentially a gear rotatable about a fixed axis and driven at uniform angular velocity, a slide adjacent this gear and connected to the bed to be driven, a cam having a closed cam track encircling the axis of the gear, and a member in the nature of a crank pin which passes through slide blocks located in slots formed in the gear and slide, and also engages the cam, the slot formed in the gear being radially disposed and that formed in the slide extending transversely to the direction in which the slide reciprocates. The cam is so shaped that, as the gear rotates in one direction at a constant angular velocity, the crank pin is caused by the cam to move radially in the slot in the gear through which it extends, the pin thus being caused to have a varying peripheral speed of movement about the axis of rotation of the gear. The linear velocity of the slide, which takes its motion from the crank pin, will vary widely at various points along its path of movement. By shaping the cam in different ways various non-uniform movements of the bed may be achieved. The bed may not only be caused to move at uniform velocity on its printing stroke and caused to return at higher velocity, but will be stopped at the end of its sliding movement in either direction, and accelerated in the opposite direction, without shock to the bed, frame, or bed actuating mechanism.

In accordance with the present invention the bed actuating mechanism is substantially improved by redesign and re-arrangement of its essential elements, the purpose being to obtain greater compactness in the driving mechanism, greater smoothness in operation of the bed and greater sturdiness and endurance of the press generally, the various operating members being so designed and placed in such cooperative relationship that no part is subjected to the action of bending or "cramping" forces and errors which ordinarily result from deflection or cramping of the operating parts of the drive mechanism are wholly eliminated. The improved driving mechanism is preferably so designed that the bed and relatively heavy slide to which it is connected and by which it is driven, reciprocate in opposite directions so that the inertia forces developed by slide and bed tend to cancel each other, leaving little or no unbalanced force acting on the frame of the press and tending to cause it to creep over the floor upon which it rests. When for any reason, however, it is desirable to have bed and slide move simultaneously in the same direction this may be accomplished by making a relatively simple change and without interfering in any way with the ability of the mechanism to reciprocate the bed in the desired manner.

The improved driving mechanism is not only more rugged and compact than those generally similar mechanisms which have heretofore been employed but, by reason of its novel design, may be more conveniently located with respect to the frame and other parts of the press. Thus it may be positioned to one side of the press instead of beneath the reciprocating frame, this reposi-

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tioning of the driving mechanism permitting strengthening of the frame where strength is most needed, i. e. below the reciprocating type bed.

The cylinder of the press is rotated constantly in one direction by power taken from one of the main gears which drives the main slide and, if desired, the bed may be advanced on its printing stroke by power also taken directly from this main gear so that, during the printing operation both bed and cylinder are directly driven from a common gear and possibility of slippage between bed and cylinder minimized. When the mechanism is so organized the control cams are modified in such manner that play is provided in the driving connection through the slide and rack to the bed so that only the direct gear drive to the bed will be effective during the printing operation. Cramping and wear might occur if the bed were connected to a power source through two separate and distinct mechanisms. At the conclusion of the printing stroke of the bed the direct gear drive to the bed becomes ineffective and the bed is returned to starting position through the driving connection which includes slide and rack.

One embodiment of the invention is illustrated in the accompanying drawings by way of example. Others will suggest themselves to those skilled in the art.

In the drawings:

Figure 1 is a side elevation of the press embodying the invention as seen from that side upon which the bed actuating mechanism is positioned, portion of the housing being broken away in order that parts of the operating mechanism may be more clearly perceived;

Figure 2 is a section on line 2—2 of Figure 1;

Figure 3 is a section on line 3—3 of Figure 1;

Figure 4 is a section on line 4—4 of Figure 2;

Figure 5 is a perspective view of a portion of one of the slotted driving gears;

Figure 6 is an exploded view of the means employed to operatively connect the gears and slide and to engage the stationary cams; and

Figure 7 is a section on line 7—7 of Figure 1.

The frame of the press is generally indicated at 10 in the drawings and is not in itself distinctive. It includes parallel side frame members 11 and 12 and a central short web 13, parallel to members 11 and 12, and extending upwardly from the bottom 14 approximately midway between the sides so as to form an intermediate support for horizontal transversely extending members 15. The several bridging members 15 in turn carry the parallel slides 16, 17 and 18, which extend longitudinally of the frame, and upon which the horizontal type bed 20 is mounted for reciprocatory movement.

A cylinder of conventional type is indicated at 21 this cylinder being supported independently of and above the bed 20 for limited vertical movement, being lowered into contact with the bed when the bed is moving on its printing stroke and lifted out of contact with the bed when the bed is moving upon its return stroke, conventional means being utilized to effect such movements in the manner in which the cylinders of two revolution bed and cylinder printing presses are customarily operated. Rigidly attached to the undersurface of bed 20 is a rack 23 and the invention contemplates the provision of novel mechanism for applying forces to the rack 23 to effect reciprocation of the bed.

Power for the operation of the press is supplied by a motor M mounted upon the base plate 14 of the frame and this motor M is operatively connected to a shaft 26, extending transversely of the frame, by V-belt drive, indicated at V, or by other suitable connecting means. One end of the power shaft 26 projects to the right of the frame 10 (Figure 2) and has mounted thereon a hand wheel 28 which also acts as a balance wheel or fly wheel, the opposite end of the drive shaft passing through a bearing in the side wall 12 of the frame and into the interior of a housing C which contains the major portion of the driving mechanism. Disposed above shaft 26 and parallel thereto is a second shaft 30, suitably mounted in bearings in the frame and carrying a gear 31 the teeth of which mesh constantly with the teeth of rack 23. It is through shaft 30 and gear 31 that power to reciprocate the bed is communicated to rack 23.

The mechanism housed within the casing C and operatively connecting shafts 26 and 30 includes two parallel mutually facing cam members 32 and 33 these cam members being secured to the side walls of the housing and being provided respectively with identical and similarly placed endless cam tracks or grooves 32a and 33a respectively. Midway between cams 32 and 33 is positioned, in a vertical plane, a slide 34, the slide being mounted for horizontal reciprocation in a plane parallel to rack 23 upon the lower and upper fixed guides 35 and 36 respectively. Slide 34 comprises a generally rectangular frame and this frame supports, midway between its upper and lower rails, a rack 38, the rack extending horizontally and being rigidly attached to the slide so as to move therewith at all times. Parallel mutually facing vertical surfaces 34a and 34b formed upon upright members of the slide and beyond the end of the rack 38 define a vertically extending slideway or slot for a slide block hereinafter to be described.

Short coaxial shafts are indicated at 39 and 40 respectively, these shafts being received within cylindrical apertures formed in the cam members 32 and 33, respectively, and being thus rigidly supported in the positions in which they are shown. Rotatably mounted on the inner end of each of shafts 39 and 40 is a gear of large diameter, these gears being indicated at 42 and 44 and respectively. These gears are identical in construction and dimension, and each has formed therein a radial slot, these slots being indicated at 42a and 44a, respectively, the radial slots of the two gears being in register, or disposed exactly opposite to each other. Gears 42 and 44 are driven by pinions 45 and 46 fixed upon the drive shaft 26 and preferably these pinions are rigidly connected by an intermediate sleeve with which they are formed integral so that they may not become axially or circumferentially displaced with respect to each other. The teeth of rack 38 are in constant engagement with those of gear 47 fixed upon shaft 30 and, as previously stated, shaft 30 is operatively connected to the bed 20 through gear 31 and rack 23.

A short shaft or pin 50 projects through the vertical slot in the central slide 34, through the registering slots 42a and 44a in gears 42 and 44 and into the cam slots 32a and 33a, this pin carrying upon its ends rollers 51 and 52 which function as cam followers and passing through cylindrical apertures formed in two similarly formed slide blocks 54 and 55 which are positioned within and adapted to move longitudinally along the radial slots 42a and 44a of the gears 42 and 44, respectively, and a cylindrical aperture in central slide block 56 which is received with a close fit within the vertical slot or slideway formed in the slide 34. The slide blocks 54, 55 and 56 are rotatable upon the pin or short shaft. Member 50 and the associated rollers and slide blocks comprise the means for communicating the rotary movement of the gears 42 and 44 to the reciprocating slide 34, the blocks 54 and 55 transmitting force derived from the gears to the pin 50, and the block 56 transmitting driving force from the pin to the slide 34.

As the gears 42 and 44 rotate in the operation of the press the distance between the axis of the short shaft 50 and the axis of revolution of the gears will vary by reason of the controlling influence of the cams 32 and 33 and, as a result, a non-uniform movement is transmitted to the slide 34, and the movement of the slide is in turn communicated to the bed through rack 38, gear 47, shaft 30 and gear 31. The shapes of cam slots 32a and 33a are such as to cause the bed to move in its printing stroke at uniform linear velocity and to be returned to initial position at higher velocity. The cam track may be shaped in various ways, in known manner, to obtain the desired non-uniform movement of the bed. By reason of the fact that two spaced cams are provided, likewise two spaced gears 42 and 44, and the slide 34 is positioned intermediate these driving gears, a balanced mechanism is provided, that is a mechanism in which no force developed can tend to distort or bend a shaft, or cramp a gear or other operating element in such manner as to tend to promote friction, undue wear and inaccuracy. The mechanism is of the most rugged construction and may be used indefinitely without loss of accuracy. It is easily accessible for the purpose of inspection and lubrication.

If thought to be desirable the bed can be directly driven from one of the main gears, upon its printing

stroke, so that both bed and cylinder take their motions from a common gear. To effect this result a segment 61 is rigidly secured to gear 42, the teeth of this segment being adapted to mesh with those of a gear 30a fixed on shaft 30, and those portions of the cam tracks 32a and 33a through which the associated cam followers 51 and 52 move while segment 61 and gear 30a are in engagement, are enlarged or relieved, as indicated at 32b and 33b, so that only the drive through gear 30a to shaft 30 will be effective for a period of time. When the segment 61 disengages gear 30a, at the conclusion of the printing stroke of the bed, the cam again becomes effective to control the movements of the short shaft 50 and the bed is returned to starting position through the action of the slide and rack. It will be understood that the use of this last mentioned mechanism is optional.

The cylinder 21 is driven from main gear 42 and the driving connection includes means for permitting the cylinder to rise and fall without causing change in relationship of the several intermeshing gears which are included in such connection. Thus the cylinder shaft 24 is mounted in journals 65 which are supported for vertical sliding movement between the spaced upper end portions of pedestals P and P', the mutually facing vertical surfaces of these upper end portions comprising parallel guide surfaces for the journals. One end of cylinder shaft 24 is prolonged so as to overhang main gear 42 and there is fixed upon the end of this prolongation a disc 66 having a radial slot 66a.

Rigidly mounted upon pedestal P is a sleeve 68 which serves as a bearing for a driving gear 69. Gear 69 is in constant mesh with an intermediate gear 60 which revolves about a fixed axis and the teeth of gear 60 are in constant mesh with the teeth of main gear 42. Motion of gear 69 is communicated to disc 66 by means of a block 70 which slidably fits within slot 66a of the disc, the slide block being rotatably mounted upon a rigid pin 71 extending laterally from gear 69. The internal diameter of bearing sleeve 68 is somewhat greater than the diameter of shaft 24 so that shaft 24 may freely move vertically with the cylinder in the normal operation of the press. The driving connection to shaft 24 will be maintained at all times, however, through gear 69, pin 71, block 70 and disc 66, block 70 sliding slightly in slot 66a when the axes of shaft 24 and bearing sleeve 68 are not coincident. This arrangement permits free vertical movement of the cylinder without requiring gear 69 to move relatively to gear 60, these gears rotating at all times about fixed parallel axes.

It will be appreciated that the design and arrangement of the component elements of the invention may be varied in adapting the same to presses of different types. The relationship of cams and gears may, for instance, be reversed, and details of design of the intermediate slide be considerably modified, all without sacrifice in efficiency or departure from the invention.

This application is a division of application Serial No. 39,695, filed July 20, 1948, now Patent 2,585,585 entitled "Printing Press Drive," issued on February 12, 1952.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a printing press of the bed and cylinder type, in combination, a bed mounted for reciprocatory movement, a cylinder mounted for rotation and for limited movement toward and away from the bed, a drive gear, means for rotating said gear at uniform angular velocity, a driving connection between said gear and said cylinder, a rotatably mounted shaft operatively connected with said bed, first and second driven gears rigidly affixed to said shaft, a segment on said driver gear to engage and mesh, during a portion of a single rotation of the drive gear, with the first of said driven gears to drive the bed on its printing stroke, said segment being out of engagement with the said first driven gear during the remainder of each rotation of the drive gear, and means independent of said segment and first driven gear for intermittently connecting the drive gear to the second driven gear to effect the return of the bed, said second means including a cam roller operatively connected to said drive gear to be revolved in one direction about the axis of said gear, and a cam having an endless groove encircling the axis of said drive gear, said groove receiving the cam roller and closely confining and guiding the same during a portion only of each single revolution of said cam roller about the said axis, the remainder of the groove being

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widened so that the roller is unguided during the time that the segment is in mesh with said first driven gear.

2. In a printing press of the bed and cylinder type, in combination, a bed mounted for reciprocatory movement, a cylinder mounted for rotation and for limited movement toward and away from the bed, a drive gear, means for rotating said gear at uniform angular velocity, a driving connection between said gear and said cylinder, a rotatably mounted shaft operatively connected with said bed, first and second driven gears rigidly affixed to said shaft, a segment on said drive gear to engage and mesh, during a portion of a single rotation of the drive gear, with the first of said driven gears to drive the bed on its printing stroke, said segment being out of engagement with the said first driven gear during the remainder of each rotation of the drive gear, and means independent of said segment and first driven gear for intermittently connecting the drive gear to the second driven gear to effect the return of the bed, said second means including a cam follower movable along a closed path encircling

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the axis of said drive gear, and a cam having a cam surface partially encircling said axis for guiding said cam follower during a portion only of each single revolution of said follower about said axis, the follower being unguided during the time that the segment is in mesh with said first driven gear, said second means further including, in addition to the cam and cam follower, a slide movable in a plane normal to the axis of said gear, a rack movable with said slide and meshing with said second gear, and a member movable with said follower and slidably engaging said slide.

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