

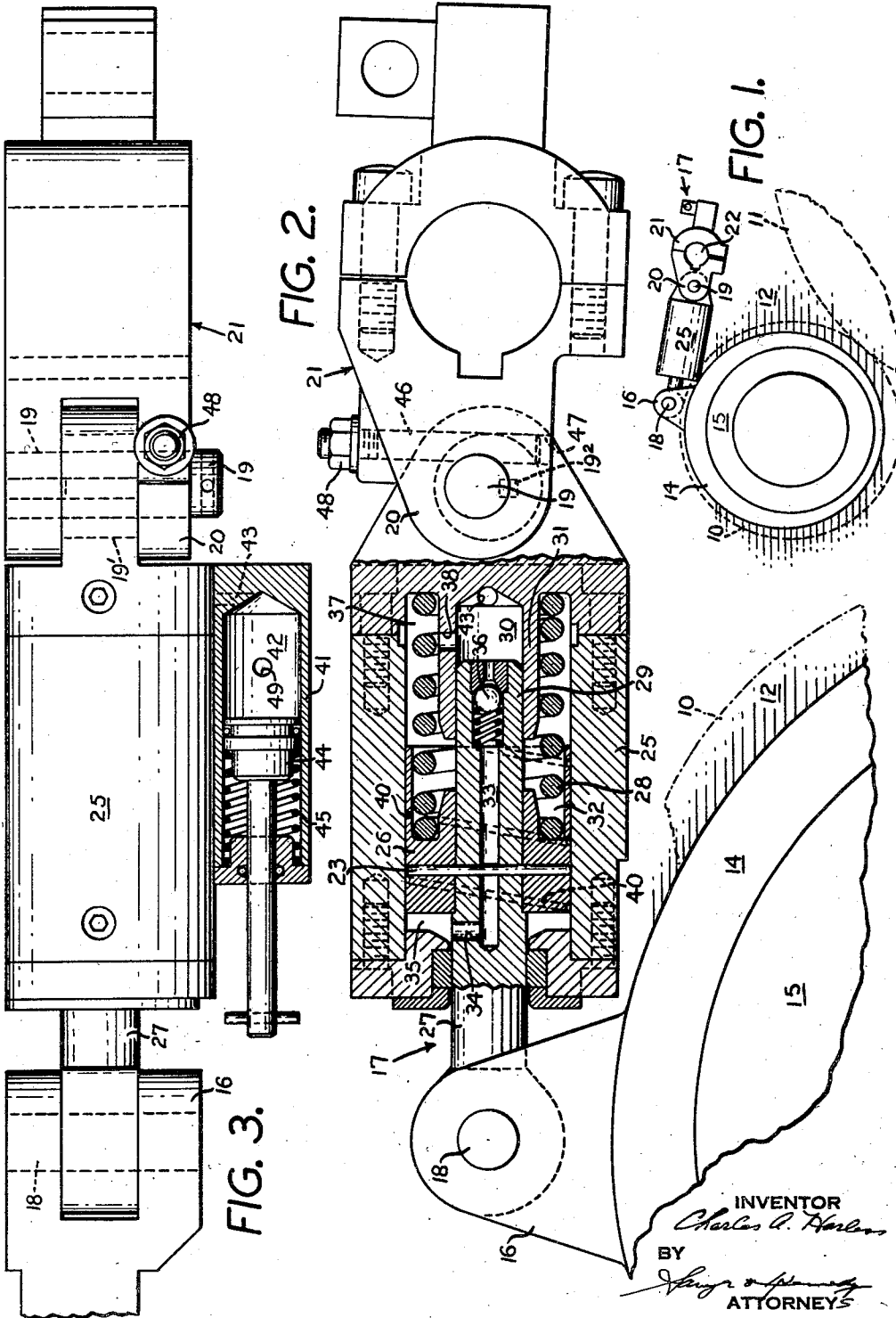
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PRINTING MACHINE IMPRESSION MECHANISM

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PRINTING MACHINE IMPRESSION MECHANISM

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8 Claims. (Cl. 101—247)

This invention relates to printing machine impression mechanism, and more particularly to such mechanism for applying printing pressure through the bearings and shaft supporting one of a pair of cooperating printing cylinders. While applicable generally, the invention is of particular importance in magazine presses or other presses in which the cylinders have rigid metal bearer rings. In machines of the type indicated, there is a tendency for differential expansion or contraction of the press frames as compared with the bearer rings to cause considerable change in pressure of the bearer rings against each other as the press operates. Also, since the bearers are rigid elements, a very small change in distance between the axes of the cooperating cylinders can produce a disproportionate and extremely large increase in pressure. It is, therefore, desirable to provide some means for adjusting the axial distance between cylinders slightly to compensate for thermal effects and thus maintain substantially predetermined bearer ring pressure, and it is also desirable to provide a means for throwing on the impression which will not require an accurate setting of parts by the press operator. As will be apparent, similar problems, although not quite so severe, are encountered even in the absence of bearer rings due to differential expansion as between the frames and cylinder bodies themselves.

Hydraulic devices in which the hydraulic cylinder exerts pressure through a piston on a cylinder bearing have been proposed, but these devices involve the use of a good deal of piping and give rise to other difficulties not found in mechanical constructions. Spring pressed elements have, in general, not been useable for the purpose indicated because, where a resilient element such as a spring is interposed between an operating member and a bearing, the initial retracting movement of the operating member in throwing off the impression involves an expansion of a spring and the engagement of a stop or limiting member may take place with a certain amount of impact.

A general object of the present invention is to provide a resilient impression mechanism for maintaining constant bearing pressure, which will not require close adjustment and which permits throwing off the impression with substantially no lost motion and substantially no impact between parts.

In accordance with the present invention, an impression adjusting element such as an eccentric bushing for supporting the plate cylinder is used in conjunction with a link or pitman incorporating a spring and hydraulic cylinder, the hydraulic cylinder being so constructed that it offers practically no resistance to relative movement of the parts in a direction tending to increase the stress on the spring; but substantially blocks relative movement in the reverse direction, thus permitting the connecting link to operate resiliently in applying impression and rigidly in throwing off the impression.

In the drawing:

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Fig. 1 is a schematic end elevation of a machine embodying the invention in a preferred form;

Fig. 2 is an enlarged elevational view of part of Fig. 1, showing the spring and hydraulic connecting link in axial section; and

Fig. 3 is a plan view of the mechanism of Fig. 2.

In Fig. 1 there is indicated in phantom a plate cylinder 10 and cooperating impression cylinder 11, together with a frame structure 12 for rotatably supporting the impression cylinder 11 and supporting the plate cylinder 10 by means of an eccentric ring 14 within which its positioned the plate cylinder bearing 15.

The eccentric bushing 14 has a fork 16, within which one end of a link 17 is pivotally connected by pin 18 and the opposite end of link 17 is pivotally connected by means of a pin 19 in a fork 20 at one end of a crank arm 21 carried on shaft 22. By rotating crank arm 21 about the axis of shaft 22 (clockwise in Fig. 2) the impression may be thrown off, eccentric bushing 14 being rotated clockwise thereby from the position of Fig. 2 where the link and crank arm are lined up and substantially on dead center, and impression pressure is applied.

The link 17 comprises a cylinder 25 within which is mounted a piston 26 carried by a piston rod 27, to which it is secured by a pin 23. Within cylinder 25 and thrusting against the piston 26 is positioned a compression spring 28. The end 29 of piston rod 27 is received within an auxiliary cylinder bore 30, the cylinder wall 31 surrounding which serves to maintain the spring 28 in alignment, the other end of the spring being received in an annular recess 32 within the piston. The piston rod 27 has a central bore 33 communicating through a cross channel 34 with hydraulic working space 35 at one end of the piston and communicating through a ball check valve 36 with the space within bore 30, which, in turn, communicates with the space 37 within the cylinder 25 through a port 38. A helical groove 40 in the piston surfaces provides a restricted passage for leakage of oil across the piston from space 35 to space 37. Oil is maintained at substantially normal or static pressure within the cylinder 25 by means of a reservoir cylinder 41 having a working space 42 communicating through the passage 43 with the space 37, and having a piston 44 to which pressure is applied by a spring 45.

Starting with the parts in the position of Figure 2, when the impression is to be thrown off, shaft 22 is rotated rapidly in the clockwise direction, pulling cylinder 25 to the right and exerting pressure through the hydraulic fluid in space 35 against piston 26. The oil groove 40 being relatively small, and the check valve 36 being closed, practically no oil can flow past the piston, and, accordingly, piston rod 27 moves with cylinder 25 practically as a rigid unit. If the impression remains off, spring 28 will gradually expand until piston 26 comes against the cylinder head, substantially eliminating the working space 35. This motion will be slow, as the leakage across the piston must pass through the groove 40. When the impression is reapplied, the piston and cylinder may occupy the relative position shown in the figure or the piston 26 may then push against the cylinder end wall, or the piston may be in any intermediate position, without substantial effect upon the operation of the device. In any event, as the parts are returned to the dead center position of the figure, piston 26, if not already pushed into the cylinder 25, will be pushed into the same to the required extent to apply the impression pressure which will be determined by the spring compression and the mechanical advantage of the spring over the impression cylinder bearing.

Adjustment for variation in thickness of packing of cylinders or for any other desired reason is provided for

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and comprises means for shifting the pin 19, so as to vary the position of the pivotal axis of link 17 and crank arm 21. Pin 19 is journaled in the fork 20 but is not journaled directly in the end of link 21. Instead, it carries an eccentric bushing 19' fixed to it by a key 19², so that turning the shaft or pin 19 varies the effective length of link 17. The element 19 may conveniently be turned as by means of a pin wrench, and is releasably locked in position by a bar 46 recessed to one side to fit the shaft 19, and slidably carried in a bore 47 in the fork 20. A nut 48 on the outer screw threaded end of the bar 46 serves to lock and unlock the pin 19, as tightening up on the nut 48 and exerting tension on bar 46 will apply a wedging action against the pin 19, preventing its rotation.

The equipment normally requires little or no servicing. The oil may be changed or replenished when necessary through any suitable opening, as for example, through a port 49 in the auxiliary cylinder 41, which port is normally plugged.

What is claimed is:

1. In a printing machine having a pair of cooperating printing cylinders and a support for one of said cylinders movably mounted for movement in one direction to increase impression pressure and in the other to throw off the impression, the combination with the said support of an operating mechanism comprising cooperating hydraulic cylinder and piston elements defining a working space, and a spring for applying impression pressure and acting between said piston and cylinder in a direction to reduce said working space, a crank, and means connecting one of the said hydraulic elements to the support and the other to the crank, the last said means being positioned so that the spring acts to force the cylinder carried by the said support in the first said direction.

2. In a printing machine having a pair of cooperating printing cylinders and a support for one of said cylinders movably mounted for movement in one direction to increase impression pressure and in the other to throw off the impression, the combination with the said support of an operating mechanism comprising cooperating hydraulic cylinder and piston elements defining a working space and having a restricted channel for flow out of the working space, and a spring for applying impression pressure and acting between said piston and cylinder in a direction to reduce said working space, a crank, and means connecting one of the said hydraulic elements to the support and the other to the crank, the last said means being positioned so that the spring acts to force the cylinder carried by the said support in the first said direction.

3. In a printing machine having a pair of cooperating printing cylinders and a support for one of said cylinders movably mounted for movement in one direction to increase impression pressure and in the other to throw off the impression, the combination with the said support of an operating mechanism comprising cooperating hydraulic cylinder and piston elements defining a working space, a check valve for permitting flow across said piston into the said working space while preventing flow out of said working space, and a spring for applying impression pressure and acting between said piston and cylinder in a direction to reduce said working space, a crank, and means connecting one of the said hydraulic elements to the support and the other to the crank, the last said means being positioned so that the spring acts to force the cylinder carried by the said support in the first said direction.

4. In a printing machine having a pair of cooperating printing cylinders and a support for one of said cylinders movably mounted for movement in one direction to increase impression pressure and in the other to throw off the impression, the combination with the said support of an operating mechanism comprising cooperating hydraulic cylinder and piston elements defining a working space, a check valve for permitting flow across said piston into the said working space while preventing flow out of

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said working space, a restricted channel for flow across said piston out of said working space, and a spring for applying impression pressure and acting between said piston and cylinder in a direction to reduce said working space, a crank, and means connecting one of the said hydraulic elements to the support and the other to the crank, whereby the said hydraulic elements act as a substantially rigid link when the crank is turned to throw off the impression and the said support is held in impression applying position by the resilient action of the said spring, the last said means being positioned so that the spring acts to force the cylinder carried by the said support in the first said direction.

5. In a printing machine having a pair of cooperating printing cylinders and an eccentric bushing for one of said cylinders rotatively mounted for movement in one direction to increase impression pressure and in the other to throw off the impression, the combination with the said bushing of an operating mechanism comprising cooperating hydraulic cylinder and piston elements defining a working space, and a spring for applying impression pressure and acting between said piston and cylinder in a direction to reduce said working space, a crank, and means connecting one of the said hydraulic elements to the bushing and the other to the crank, the crank being positioned so as to be on dead center in impression applying position, and the said means connecting the hydraulic elements to the bushing being arranged so that the spring acts to turn the eccentric bushing in a direction to increase impression pressure.

6. In a printing machine having a pair of cooperating printing cylinders and an eccentric bushing for one of said cylinders rotatively mounted for movement in one direction to increase impression pressure and in the other to throw off the impression, the combination with the said bushing of an operating mechanism comprising cooperating hydraulic cylinder and piston elements defining a working space, and a spring for applying impression pressure and acting between said piston and cylinder in a direction to reduce said working space, a crank, means connecting one of the said hydraulic elements to the bushing and the other to the crank, the crank being positioned so as to be on dead center in impression applying position, one of the said connecting means being adjustable for varying the length of the working space when the crank is on dead center, and the said means connecting the hydraulic elements to the bushing being arranged so that the spring acts to turn the eccentric bushing in a direction to increase impression pressure.

7. In a printing machine having a pair of cooperating printing cylinders and an eccentric bushing for one of said cylinders rotatively mounted for movement in one direction to increase impression pressure and in the other to throw off the impression, the combination with the said bushing of an operating mechanism comprising cooperating hydraulic cylinder and piston elements defining a working space, a check valve for permitting flow across said piston into the said working space while preventing flow out of said working space, and a spring for applying impression pressure and acting between said piston and cylinder in a direction to reduce said working space, a crank, and means connecting one of the said hydraulic elements to the bushing and the other to the crank, the crank being positioned so as to be on dead center in impression applying position, and the said means connecting the hydraulic elements to the bushing being arranged so that the spring acts to turn the eccentric bushing in a direction to increase impression pressure.

8. In a printing machine having a pair of cooperating printing cylinders and an eccentric bushing for one of said cylinders rotatively mounted for movement in one direction to increase impression pressure and in the other to throw off the impression, the combination with the said bushing of an operating mechanism comprising co-

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operating hydraulic cylinder and piston elements defining a working space, a check valve for permitting flow across said piston into the said working space while preventing flow out of said working space, and a spring for applying impression pressure and acting between said piston 5 and cylinder in a direction to reduce said working space, a crank, means connecting one of the said hydraulic elements to the bushing and the other to the crank, the crank being positioned so as to be on dead center in impression applying position, and one of the said connecting 10 means being adjustable for varying the length of the working space when the crank is on dead center, and the

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said means connecting the hydraulic elements to the bushing being arranged so that the spring acts to turn the eccentric bushing in a direction to increase impression pressure.

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