Aug. 15, 1950 H. GERLACH 2,518,878

PRESSURE ADJUSTMENT IN ROTARY PRINTING MACHINES

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Fig. 1

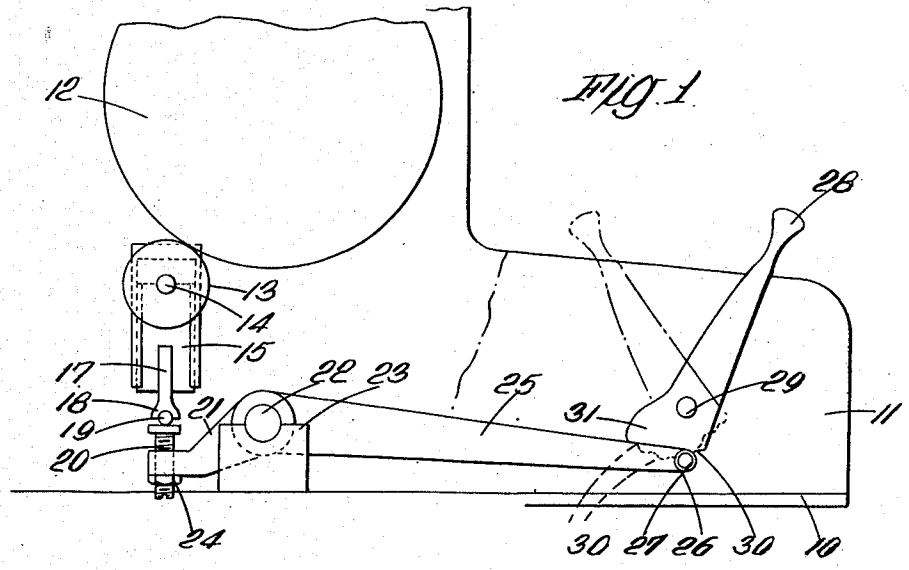
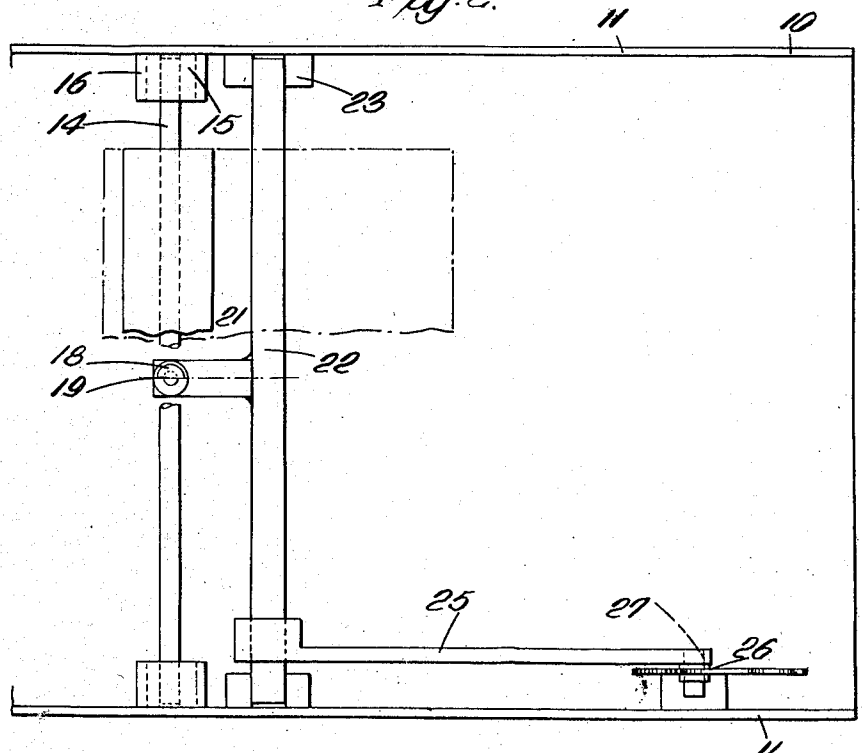


Fig. 2.



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PRESSURE ADJUSTMENT IN ROTARY PRINTING MACHINES

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13 Claims. (Cl. 101—247)

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This invention relates to rotary printing machines embodying a printing couple consisting of a rotatable printing cylinder or drum and a rotatable pressure or platen roller, and is applicable with particular advantage to spirit reproducing machines in which a mirror-script master is mounted upon the printing cylinder and copies are taken on copy sheets or a web passed between the printing cylinder and the pressure roller; moistening being effected with a spirit solvent for the hectograph ink upon the mirror-script master to enable the copies to be produced. In such machines the proper adjustment of the pressure roller plays a significant part in determining the quality of reproduction and the number of copies which can be obtained from a given master.

One object of the invention is to provide modified and improved mechanism for applying the pressure roller to the printing cylinder which is capable of rapid and easy assembly and dismantling so that the roller is pressed against the cylinder with even pressure and uninterrupted contact along the entire effective axial length thereof and so that the pressure between the roller and cylinder can be evenly adjusted along the entire axial length by the manipulation of a single control.

Another object of the invention is to provide means for applying the pressure roller to the printing cylinder in such a manner that the pressure roller can be set simply and quickly to any of a number of predetermined pressure values and as readily removed from contact with the work or printing roller by manipulation of a single control.

A further object of the invention is to provide a printing machine construction in which the pressure roller or platen is urged towards the printing cylinder by a force transmitted through a system of levers, the pivots of which are journalled in open bearings so disposed that the reaction of the operating forces transmitted through such lever system serve to retain the journalled members in proper position.

Yet a further object of the invention is to provide an arrangement as last recited in which the system of levers is arranged to possess inherent resilience sufficient to provide a suitable yielding pressure upon said pressure or platen roller by appropriate positive location of the opposite end of said lever system without the interposition of additional spring or like resilient pressure exerting means.

Other objects of the invention will be apparent

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from the following detailed description of one constructional embodiment now to be given by way of example with reference to the accompanying drawings in which:

Fig. 1 is a diagrammatic representation of the printing couple of a rotary printing machine of the spirit duplicating type embodying pressure cylinder mechanism according to the present invention and

Fig. 2 is a diagrammatic plan view of the arrangement shown in Fig. 1.

Referring to the drawings, 10, 11 indicate the base and side frames of the machine, 12 the printing cylinder or drum, and 13 the pressure or platen roller, which is mounted upon a spindle 14 journalled at its ends in plain bearing blocks 15 of the open top or half bearing type. Bearing brackets 16 are formed integral with, or secured to, the side frames 11 and arranged slidably to support the bearing blocks 15 in downwardly opening guide channels so that the blocks are freely movable in a direction normal to the axis of rotation of the printing cylinder. Alternatively, the ends of spindle 14 may be journalled in ball or roller bearings which could be carried in blocks or frames adapted slidably to engage in bearing brackets 16.

The lower end of each bearing block 15 is slotted so as freely to receive the ends of a lift bar 17 which extends between the blocks 15 and is provided on its lower edge, at the central point between the bearing blocks, with a cup 18 to receive a ball 19. A thrust screw 20, provided with an enlarged head for engagement with the ball 19 in the manner of a universal thrust coupling, is screwed into an arm 21 which is formed integral with, or fixed to, a transverse rock shaft 22; the thrust screw being set in its position of adjustment by means of a locking nut 24. The shaft 22, which constitutes the pivot of a lever system, is journalled in half bearings 23 which are secured to, or formed integral with the side frames 11 and disposed so that the rock shaft lies parallel with the axis of the pressure roller 13.

A lever 25 of appreciable length is keyed, or otherwise secured, to rock shaft 22 so as to extend parallel to, and adjacent the inner wall of one of the side frames 11. The lever 25 is tapered in width for a purpose hereinafter described and carries, at its free end, a roller 26 which is journalled upon a pin 27 so as to project outwards from the side of the lever and towards the adjacent side frame 11.

A hand lever 28 is pivotally secured by pin 29

to the inner wall of the side frame 11 immediately above the free end of lever 25 so that the lower cammed end of the hand lever engages roller 26. A series of notches 30 having their centres upon an arc eccentric to the point of pivotation of hand lever 28 are formed in the lower cammed end of the latter to receive roller 26, and an ear 31 is provided at the end of the notched part of the lever to prevent the latter from being turned beyond the useful limit of its movement. Alternatively, or in addition to the ear 31, a stop (not shown) may be provided upon the frame 11 to limit the movement of the hand lever.

The tapering of lever 25, made from spring steel, enhances the degree of resilience of this member so that by suitable setting of thrust screw 20 a spring loading of the lever system can be achieved to maintain the roller 26 in contact with hand lever 28 and yieldingly to urge pressure roller 13 into contact with the work or printing cylinder 12 with a suitable degree of pressure and resilience to provide proper printing operation without the need of interposing additional means such as springs or the like.

The functioning of the invention is obvious from the foregoing description and need be no more than briefly recapitulated. By placing the hand lever into the full line position shown in Fig. 1 and then adjusting thrust screw 20 in arm 21 so as to bring the pressure roller 13 into light contact with the printing cylinder 12, the mechanism is set so that movement of the hand lever, notch by notch, towards the position shown in chain-dot outline will depress the free end of lever arm 25 and raise arm 21, thrust screw 20 and lift bar 17, thus to move the slidable bearing blocks 15 upwards in their guide brackets 16 so that the pressure roller 13 is applied to the printing cylinder 12 with progressively increased pressure as the stressing of the lever arm 25 is increased while the entry of roller 26 into any of the notches 30 serves to retain lever 28 against inadvertent movement from the position in which it is set. Furthermore, by reason of the universal thrust coupling between arm 21 and lift bar 17 at the geometrical centre of the distance between the bearing blocks, the pressure roller is applied to the printing cylinder with substantially equal pressure along the entire length of their contacting surfaces. By movement of the hand lever in the opposite direction beyond the full line position shown in Fig. 1 the pressure roller can be permitted to break contact with the work or printing cylinder.

The reaction of the forces applied in the operation of the mechanism firmly retain the pressure roller spindle 14 and rock shaft 22 in their supporting half bearings which in turn facilitate the rapid and easy assembling and dismantling of the mechanism as and when required by allowing the removal of arm 21, shaft 22 and lever 25 and then the roller 13 by the simple expedient of releasing the lever 28 from contact with the roller 26 and then lifting the parts out without having to remove any other elements such as bearing caps, set screws or guide covers.

The invention is not restricted in its application to spirit duplicating machines and constructional modification and developments of the above described practical embodiment may be devised within the ambit of the appended claims.

I claim:

1. In a rotary printing machine, a printing cylinder, a pressure roller for cooperation with said printing cylinder, means for urging said pressure roller into yielding contact with said printing cylinder comprising a first order lever of spring material in engagement at one end with said pressure roller and at the opposite end with adjustable rigid stop means positioned to stress said lever and journal bearings for the fulcrum pivot of said lever comprising open half-bearings so disposed that the reaction of the forces operating upon said lever system serves to retain the pivots in position in said half bearings.

2. In a rotary printing machine, a printing cylinder rotatably mounted in a machine frame, a rotatable pressure roller for cooperation with said printing cylinder, said pressure roller being journalled at each end in floating bearings slidably mounted in said machine frame for movement towards and away from the surface of said printing cylinder, a rigid bar member extending between each of said floating bearings, means for urging said pressure roller into yielding contact with said printing cylinder comprising a first order lever having one arm in engagement at its free end with the mid-region of said rigid bar member and having its second arm formed as a resilient leaf spring in engagement at its free end with rigid stop means positioned to stress said leaf spring arm, and journal bearings for the pivots of said lever system comprising open half-bearings so disposed that the reaction of the stress applied to said leaf spring serves to retain the pivots in position in said half-bearings.

3. In a rotary printing machine in accordance with claim 2, the provision of manually adjustable means for regulating the pressure applied to urge said pressure roller into contact with said pressure cylinder and comprising mechanism for altering the position of said rigid stop means in engagement with the free end of said leaf spring arm of said lever whereby the latter is made capable of being stressed to different degrees.

4. In a rotary printing machine in accordance with claim 2, the provision of manually adjustable means for regulating the pressure applied to urge said pressure roller into contact with said pressure cylinder and comprising mechanism for altering the position of said rigid stop means in engagement with the free end of said leaf spring arm of said lever whereby the latter is made capable of being stressed to different degrees, said mechanism being in the form of a hand lever pivotally mounted upon the machine frame and provided with a cammed surface divided into a series of notches each of different radial distance from the pivot of said hand lever and position so as to be engageable selectively with an abutment formed on said free end of said leaf spring lever arm.

5. A rotary duplicating machine comprising a machine framework having opposed side frame members, a rotatable printing cylinder journalled in said side frame members and extending transversely therebetween, a rotatable pressure roller disposed parallel to said printing cylinder and having projecting spindle pivots at each end, bearing blocks of the open half-bearing type for receiving and supporting the spindle pivots of said pressure roller, bearing brackets on each of said side frame members for slidably supporting said bearing blocks for movement in directions towards and from the surface of said printing cylinder, slots in said bearing blocks at the ends thereof opposite to those having the open half-bearing surfaces, a bar member extending transversely of the machine and engaging at each of its ends in said slots, a cup-shaped depression

in the center of said bar member on the side thereof opposite to that facing said pressure roller, a loose ball seated in said depression, a rock shaft disposed transversely between said side frame members, an arm projecting radially from the center region of said rock shaft and carrying a thrust screw having a head surface positioned to engage said loose ball and thereby to exert pressure through said bar member equally to each of said bearing blocks so as to urge said pressure roller into contact with said printing cylinder when said rock shaft is constrained to rotate in a chosen direction, an extended lever arm of spring material secured at one of its ends to said rock shaft near one end of the latter, a manually adjustable position stop device in engagement with the other end of said extended lever arm and serving, through the flexing of said extended lever arm to urge rotation of said rock shaft so as to impart pressure to said ball, and journal bearings for the opposite ends of said rock shaft, said journal bearings being carried upon said side frame members and comprising open-half bearings so disposed that the reaction of the pressure force exerted upon said pressure roller serves to retain the ends of said rock shaft properly seated in said half bearings.

6. A rotary duplicating machine comprising a machine framework having opposed side frame members, a rotatable printing cylinder journalled in said side frame members and extending transversely therebetween, a rotatable pressure roller disposed parallel to and below said printing cylinder and having projecting spindle pivots at each end, bearing blocks slidably mounted on each of said side frame members for up and down movement in a vertical direction open half-bearing surfaces at the upper ends of each of said bearing blocks, a bar member disposed transversely of the machine and engaging at each end with the underside of one of said bearing blocks, a rock shaft also disposed transversely of the machine between said side frame members, a short stiff arm projecting radially from the mid-region of said rock shaft to one side thereof and carrying a universal thrust coupling device engaging the mid-region of said bar member for exerting upward pressure thereto by appropriate rotation of said rock-shaft, an extended lever arm of spring material secured to said rock-shaft, means for applying pressure to the free end of said extended lever arm so as to stress said arm to constrain said rock-shaft to rotate in said appropriate direction and journal bearings for the opposite ends of said rock shaft, said journal bearings being carried upon said side frame members and comprising open half-bearings so disposed that the reaction of the pressure force applied through said lever system serves to retain the ends of said rock shaft properly seated in said half-bearings.

7. A rotary duplicating machine in accordance with claim 6 wherein said extended lever arm of spring material is disposed so as to lie at the opposite side of said rock shaft relative to said short stiff radially projecting arm and wherein said journal bearings for said rock shaft consist of blocks secured to said side frame members and provided upon their uppermost surfaces with open half-bearing surfaces.

8. A rotary duplicating machine in accordance with claim 6 in which said extended lever arm of spring material is tapered towards its free end.

9. A rotary duplicating machine in accordance with claim 6 in which said extended lever arm of spring material is secured to said rock-shaft near one end of the latter and is positioned to lie closely adjacent one side frame member of the machine frame.

10. A rotary duplicating machine comprising a machine framework having opposed side frame members, a rotatable printing cylinder journaled in said side frame members and extending transversely therebetween, a rotatable pressure roller disposed parallel to and below said printing cylinder and having projecting spindle pivots at each end, bearing blocks slidably mounted on each of said side frame members for up and down movement in a vertical direction, open half-bearing surfaces at the upper ends of each of said bearing blocks, a bar member disposed transversely of the machine and engaging at each end with the underside of one of said bearing blocks, a rock shaft also disposed transversely of the machine between said side frame members, an arm projecting radially from the mid-region of said rock shaft to one side thereof, a thrust screw having a plane head surface and threaded into an aperture in said radially projecting arm at a position where said plane head faces said bar member, a cup shaft depression formed of the lower surface of said bar member opposite said head of said screw, a loose ball secured in said depression between said bar member and said head, an extended lever arm secured to said rock-shaft, means for applying pressure to the opposite end of said extended lever arm so as to constrain said rock-shaft to rotate in a direction to exert upward pressure upon said bar member through said ball and journal bearings for the opposite ends of said rock-shaft, said journal bearings being carried upon said side frame members and comprising open half-bearings so disposed that the reaction of the pressure force applied through said lever system serves to retain the ends of said rock shaft properly seated in said half-bearings.

11. A rotary duplicating machine comprising a machine framework having opposed side frame members, a rotatable printing cylinder journalled in said side frame members and extending transversely therebetween, a rotatable pressure roller disposed parallel to and below said printing cylinder and having projecting spindle pivots at each end, bearing blocks slidably mounted on each of said side frame members for up and down movement in a vertical direction, open half-bearing surfaces at the upper ends of each of said bearing blocks, a bar member disposed transversely of the machine and engaging at each end with the underside of one of said bearing blocks, a rock shaft also disposed transversely of the machine between said side frame members, journal bearings for the opposite ends of said rock shaft and comprising open half-bearings carried upon said side frame members and disposed to resist downward movement of said rock shaft, an arm projecting radially from the mid-region of said rock shaft to one side thereof and carrying a universal thrust coupling device engaging the mid-region of said bar member for exerting upward pressure thereto by appropriate rotation of said rock-shaft, an extended lever arm secured to said rock-shaft, means for applying pressure to the opposite end of said extended lever arm so as to constrain said rock-shaft to rotate in said appropriate direction, said pressure applying means comprising a hand lever pivoted on one side frame member and provided with a cammed portion divided into a series of notches each of different radial distance from the pivot of side hand lever and

which are successively engageable by an abutment carried by the free end of said extended lever arm.

12. A rotary duplicator machine comprising a machine framework having opposed side frame members, a rotatable printing cylinder journalled in said side frame members and extending transversely therebetween, a rotatable pressure roller disposed parallel to and in peripheral contact with said printing cylinder and having projecting spindle pivots at each end, movable bearing means engaging said projecting spindle pivots for carrying said pressure rollers in a bodily movable manner whereby said roller may be moved radially towards or away from said printing cylinder, lever mechanism including a resilient element associated with said bearing means for moving said pressure roller towards said printing cylinder, a hand lever pivoted in said machine framework and provided with a cammed portion divided in a series of notches each of different radial distance from the pivot of said hand lever, an abutment carried by said resilient lever mechanism for engagement with said series of notches whereby the engagement with said series of notches whereby the engagement pressure between said pressure roller and said printing cylinder may be adjusted by altering the position of said pivot hand lever to cause said abutment to be engaged by a different one of said notches and thereby to strain the resilient means of said lever system to a different extent.

13. A rotary duplicating machine comprising a machine framework having opposed side frame members, a rotatable printing cylinder journalled

in said side frame members and extending transversely therebetween, a rotatable pressure roller disposed parallel to said printing cylinder and in peripheral engagement therewith, movable bearing means for said pressure roller, said bearing means being movable to cause said pressure roller to move in a radial direction towards or away from said printing cylinder, a hand lever pivoted transversely within said machine framework, said hand lever comprising a cammed portion divided into a series of spaced notches each of different radial distance from the pivot of said hand lever, a lever arm of spring material pivoted in said machine framework and carrying an abutment engageable with one or the other of the notches of said hand lever portion and pressure-transmitting means interconnecting said lever arm and said bearing means for said pressure roller.

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