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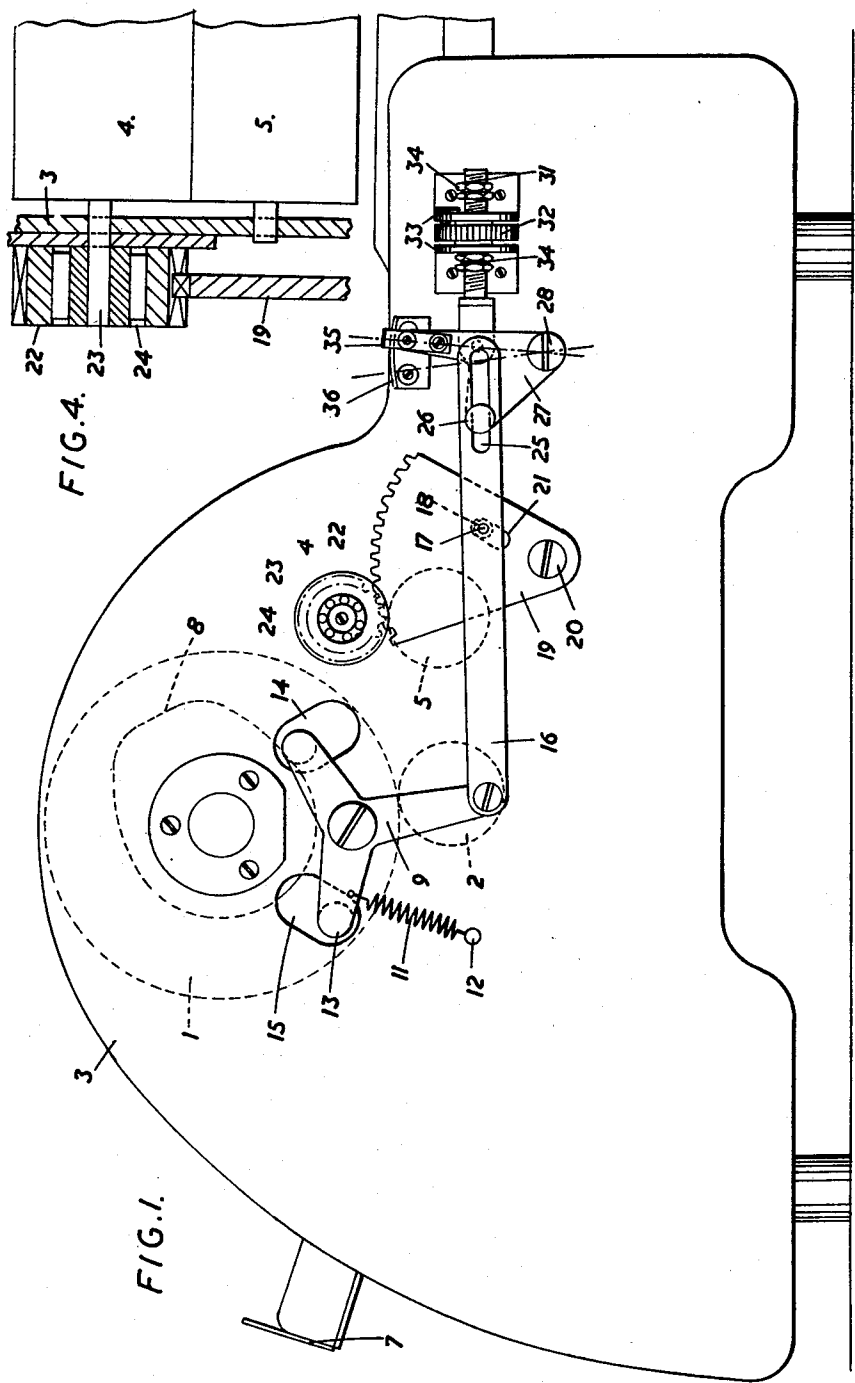
H. GERLACH

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SHEET FEEDING ARRANGEMENT FOR ROTARY PRINTING MACHINES

Filed Sept. 23, 1948

2 SHEETS—SHEET 1



Inventor *HUGO GERLACH*
By *G. Pr. Deller*
Attorney

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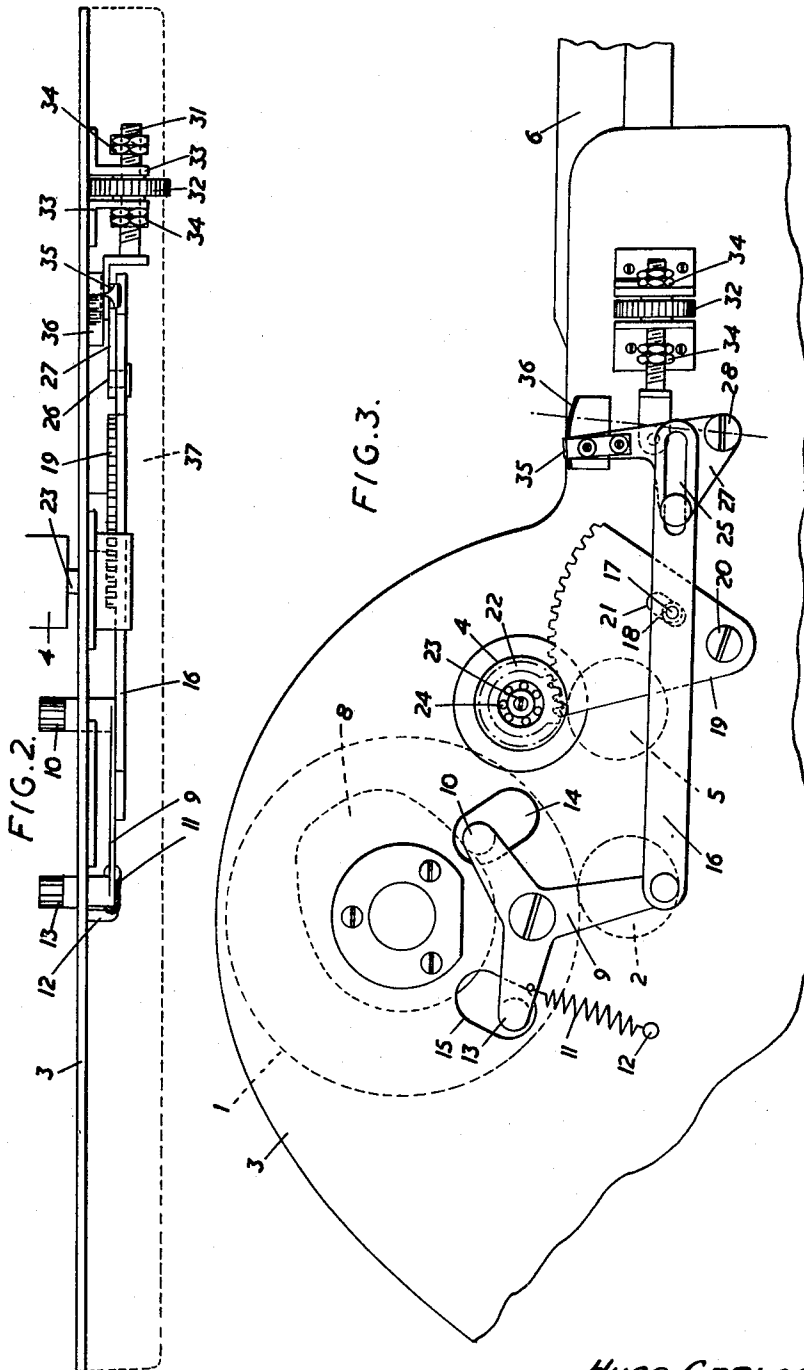
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2 SHEETS—SHEET 2



HUGO GERLACH
Inventor

By *C. Pr. Weller*
Attorney

UNITED STATES PATENT OFFICE

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SHEET FEEDING ARRANGEMENT FOR
ROTARY PRINTING MACHINES

Hugo Gerlach, London, England, assignor to
Block & Anderson Limited, London, England,
a corporation of Great Britain

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4 Claims. (Cl. 101—132.5)

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This invention relates to sheet feeding arrangements for rotary printing machines and has for its main object to provide an improved feeding arrangement which is positive in operation and can be timed in relation to the rotary printing couple so as to ensure correct registration between the fed sheet and the printing surface of the printing roller. The sheet feeding arrangement is adapted particularly for use in rotary hectographic printing machines in which the matter to be printed (or copied) is provided in mirror script in hectographic ink on a sheet (the master) secured to the printing drum, the copies being obtained by passing sheets moistened with a solvent for the hectographic ink between the printing drum and a co-operating pressure roller.

In sheet-feeding arrangements for rotary printing machines it is already known to provide intermittently driven feed rollers which initially are driven to advance the copy sheet to the bite of the printing couple and thereafter the sheet is entrained by the rotation of the printing couple, the drive to the feed rollers being suspended. Such a feed arrangement is described and shown for example in my prior U. S. application Ser. No. 655,760, filed March 20, 1946, in which the intermittent drive is obtained by the intermittent engagement of a toothed segment secured to the printing drum with a toothed wheel in driving association with one of the feed rollers. With such an arrangement it is difficult to ensure that the driven feed roller comes to rest in a predetermined position, and to avoid undue noise and wear during operation, so that particularly after the machine has been in use for some time, trouble may be encountered in obtaining proper registration between the copy sheet and the matter to be copied. Accurate registration is of particular importance when the copy is required on a pre-printed form.

According to the present invention, the drive of the feed-rollers is derived from the rotation of the printing couple by means including a toothed sector which is oscillated by the rotation of the printing couple and which is in constant engagement with a toothed wheel associated with a shaft by means of a uni-directional coupling or free-wheel device, whereby the shaft is driven when the toothed sector moves in one direction, whereas the toothed wheel rotates freely relatively to the shaft when the toothed sector moves in the other direction. The said shaft may carry the driven feed roller or may be connected by positive gearing to a shaft carrying the driven feed roller.

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In order that the invention may be more readily understood, reference will now be had to the accompanying drawings, which show, by way of example, a preferred embodiment as applied to a rotary hectographic copying machine, and in which:

Figure 1 is a general side view of the machine in one extreme position of the adjustment.

Figure 2 is a fragmentary top plan view of the adjusting mechanism as shown in Figure 1.

Figure 3 is a fragmentary side view in the other extreme position of adjustment.

Figure 4 is a fragmentary cross section showing a detail on an enlarged scale.

The printing drum or master drum 1 on which is secured a master sheet bearing in mirror script in hectographic ink the matter to be reproduced, may be rotated in any convenient manner with either a hand or motor drive, as is well known in such hectographic copying machines. Co-operating with the master drum 1 to form the printing couple is a pressure roller 2. The drum 1 and the roller 2 are journaled in bearings in the side frames 3 of the machine. The sheets to receive the copies are fed singly to the printing couple by a pair of feed rollers 4, 5, the roller 4 being the driven roller. A supply of copy sheets or a single sheet, as desired, is placed on the feed table 6 which is at the front of the machine (the right-hand end of Figures 1 and 3) and the sheet (or uppermost sheet of a pile) is advanced to the bite of the feed rollers 4, 5 where the line of contact between the rollers forms a locating stop for the leading edge of the sheet. On operating the machine, the printing drum 1 is rotated, the feed rollers 4, 5 advance the sheet until the leading edge is gripped by the printing couple and in the continued rotation of the drum 1 the sheet is entrained thereby and brought into contact with the hectographic master. In its passage to the drum 1, the sheet is moistened by a solvent for the hectographic ink, any convenient moistening device being utilised. Preferably a moistening device according to my said U. S. application Ser. No. 655,760 is employed, in which the solvent is applied to an upwardly inclined capillary pad and is transferred from the upper edge of the pad to the upper feed roller 4. This moistening device is fully described and illustrated in the application referred to, and as it does not constitute part of the present invention it will not be further described herein. After passing between the master drum and the pressure roller to have the copy printed on it, the sheet is received by the delivery tray 7 at the rear of the machine.

To derive the rotation of the feed rollers 4, 5

from the rotation of the master drum 1, a cam 8 is secured on the shaft of the drum or to the end face of the drum so as to rotate therewith. A rocker 9, pivotally mounted on the side frame 3 of the machine, carries a cam follower roller 10 which by means of a spring 11 is held in contact with the edge of the cam 8. The spring 11 extends between the rocker 9 and an anchor post 12 mounted on the side frame 3. To ensure the return of the rocker 9, it carries a second roller 13 which by engagement with the cam 8 positively restores the rocker if the spring 11 has failed to maintain the follower roller 10 in contact with the cam. As the cam 8 and the rocker 9 are arranged on opposite sides of the side frame 3, the side frame is provided with elongated slots 14, 15 through which the rollers 10 and 13 extend. The oscillatory movement of the rocker 9 is transmitted by way of a link 16 provided with a pin 17, preferably furnished with a roller 18 as shown, which engages with a toothed sector 19 pivotally mounted on a pin 20 carried by the side frame 3. In the embodiment shown, the roller 18 is received in a substantially radial slot 21 in the toothed sector 19. By means of the connecting link 16, the toothed sector 19 is caused to rock simultaneously with the rocker 9. The toothed sector 19 is constantly in mesh with a pinion wheel 22 mounted on a shaft 23 with the interposition of a unidirectional coupling or free wheel device 24. This device may be of any convenient construction, that shown being assumed to be of the well-known wedging roller type, whereby in the counter-clockwise movement of the toothed sector 19 as viewed in Figures 1 and 3, the shaft 23 is driven, whereas in the opposite movement of the sector 19 the pinion 22 rotates relatively to the shaft 23. The arcuate length of the toothed sector 19 is so chosen in relation to the movement which can be imparted from the cam 8 by way of the link 16, that the toothed sector 19 is constantly in mesh with the pinion 22. The drive transmitted to the feed roller shaft 23 and thus to the directly driven feed roller 4 and the co-operating feed roller 5 is chosen so as to be at least sufficient to advance the sheet from the line of contact of the feed rollers 4, 5, to the line of contact of the printing couple 1, 2. Once the sheet has been engaged by the printing couple it is entrained thereby, this being permitted by the free wheel device 24. Due to this device also, the toothed sector 19 can revert to its position as shown in Figures 1 and 3, while the entrained sheet causes the feed rollers 4, 5 to continue to rotate in the feed direction. With the drive to the feed rollers as described above, it is desirable to be able to adjust the moment of initiation of the feed drive and/or the rate of drive so as to afford the possibility of regulating the registration of the copy sheet in relation to the matter to be copied. This is of particular importance when the copy is to be taken on a ruled or otherwise pre-printed sheet. It is desirable also that this adjustment of registration should be possible between consecutive printing operations without the services of a trained mechanic. This result is achieved with the adjusting mechanism which is shown in the accompanying drawings and which will now be described.

The connecting link 16 extends beyond the toothed sector 19 towards the front of the machine and adjacent its forward end is provided with a longitudinally extending slot 25. A pin 26 on a pivotal member 27 carried by a pivot pin

28 engages in the slot 25, so that by pivotation of the member 27 about its pivot pin 28, the pin 26 is displaced in the slot 25 and thereby raises or lowers this end of the link 16. The roller 18 is correspondingly raised or lowered in the slot 21 in the toothed sector 19. When the roller 18 is towards the upper end of the slot 21 as in Figure 1, the fixed throw of the rocker 9 causes a smaller angular movement of the sector 19 and thus a slower feed movement of the feed rollers 4, 5 in relation to the peripheral speed of the master drum 1, whereas when the roller 18 is towards the lower end of the slot 21 as in Figure 3, there is a larger angular movement of the sector 19 and a faster feed movement of the feed rollers 4, 5 in relation to the peripheral speed of the master drum 1. Thus, starting from a given rest position of the master drum 1, it is possible to alter the registration, i. e. the position of the leading edge of the copy sheet in relation to the leading edge of the master sheet.

For the adjustment of the pin 26 in the slot 25, the pivotal member 27 is connected to a threaded rod 31 carrying a milled adjusting nut 32. This adjusting nut is located between fixed cheeks 33 secured to the side frame 3, so that rotation of the nut 32 causes corresponding axial movement of the threaded rod 31 and thus corresponding pivotal movement of the member 27. Lock nuts 34 on the rod 31 serve to limit the maximum travel of the rod 31 and consequently prevent damage to the adjusting device by attempts to adjust beyond the available amounts.

To enable the degree of adjustment to be observed, a graduated scale 36 is secured to the side frame 3 and a pointer or index 35 mounted on the pivotal member 27 is arranged to travel over the scale. The whole of the mechanism arranged on the outside of the side frame 3 may be concealed in a cover plate provided with a window to enable the scale 36 and the pointer 35 to be read, and an aperture to permit the outermost part of the milled nut 2 to project for fingertip manipulation by the operator. The contour of such a cover plate is indicated at 37 in Figure 2 in chain-dotted lines.

I claim:

1. A printing machine comprising in combination a printing couple and a pair of sheet feed rollers, a pinion in unidirectional coupling with one roller, a toothed sector oscillatable on the machine in constant mesh with said pinion, a rocker oscillatable on the machine in constant driven engagement with an element of the printing couple, a link in pivotal connection with said rocker and with the toothed sector for oscillation of the sector in response to oscillation of the rocker, and means for moving said link to dispose its connection with the sector selectively at different distances radially of the sector to vary the extent of oscillation of the sector.

2. A printing machine comprising in combination a printing couple and a pair of sheet feed rollers, a pinion in unidirectional coupling with one roller, a toothed sector oscillatable on the machine in constant mesh with said pinion, a rocker oscillatable on the machine in constant positive driven engagement with an element of the printing couple, a link in positive connection with both said rocker and the toothed sector for oscillation of the sector in response to oscillation of the rocker, and manually operative means in constant engagement with a portion of the link for shifting the link to dispose its connection with the sector selectively at different distances

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radially of the sector for adjustment of the feed roller operating stroke of the sector.

3. A printing machine comprising in combination a printing couple and a pair of sheet feed rollers, a pinion in unidirectional coupling with one roller, a toothed sector oscillatable on the machine in constant mesh with said pinion, a rocker oscillatable on the machine in constant positive driven engagement with an element of the printing couple, a link in positive connection with both said rocker and the toothed sector for oscillation of the sector in response to oscillation of the rocker, said link at one end extending beyond the rocker, and an adjustment member pivoted on the machine and having a stud slidably engaging the extending end of the link to shift the link radially of the toothed sector in response to movement of the member, whereby to shift the connection between the link and sector radially of the sector for selectively varying the

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extent of the feed roll operating stroke of the sector.

4. The structure of claim 3, and cooperative index and scale means on said adjustment member and the machine frame for indicating the adjustment effected.

HUGO GERLACH.

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