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WEB REGISTERING MEANS

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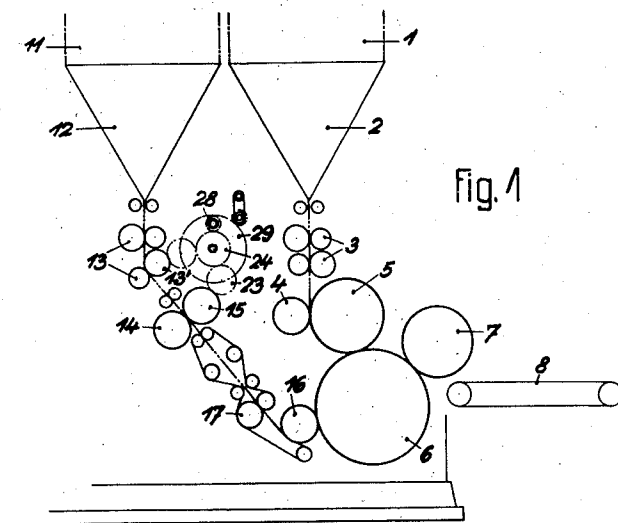


Fig. 1

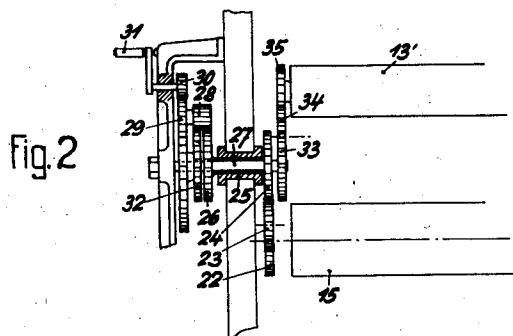


Fig. 2

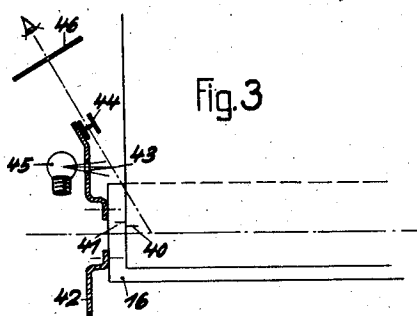


Fig. 3

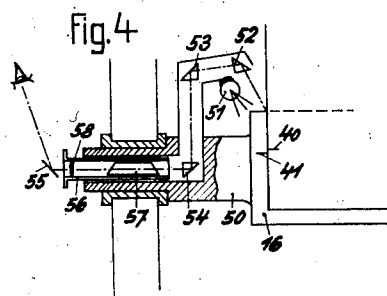


Fig. 4

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WEB-REGISTERING MEANS

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This invention concerns improved means for feeding a web in proper register.

Devices have already been proposed whereby a paper-web which has previously been printed upon and then rewound to a roll may be controlled in such a manner that the speed of removal of said web is maintained in conformity with the speed of feed of a further printed product arriving, say, from a printing machine. The electrical relays and mechanical control devices employed for this purpose need, however, a certain time period within which to respond. This has such a delaying effect upon the speed of travel of the paper-web that known arrangements of this type do not allow of the attainment of nearly the speed of operation of the printing machine which it is essential should be provided in, namely, newspaper printing machines. Furthermore for the proper operation of these devices gauging marks on the previously printed paper web, for example imprints with an electrically conducting dye-stuff or perforations, are necessary and these are such as to require for their production a separate step in the operations and loss of paper.

A sufficiently high speed of travel of the previously printed paper web can only be attained if, in accordance with this invention, the feed of the latter is observed by special optical devices and a control device provided on the printing machine is set accordingly. In this case, first of all, no separate working step is necessary for the preparation of the gauging marks on the paper web since these may be printed in the same colour as the printed representation; use may even be made for this purpose of any characteristic line in said printed representation, for example the edge of the letterpress, so that separate gauging marks are unnecessary and the attendant loss of paper is eliminated. This is a very substantial advance more particularly as the novel arrangement does not have any delaying effect upon the speed of operation of the printing machine.

The preferred optical devices have been used heretofore only for observing phenomena in rotating machine parts. It was not

known that they might also be employed for the observation of the proper feed of paper webs to a rotary cylinder. To this end according to the invention both the cylinder in question, wherein said optical devices are provided, and also the paper web are furnished with simple observation marks the mutual co-ordination of which indicates the regular feed or removal of the previously printed paper web. In this fashion a novel range of applications is created for said optical devices and, moreover, a technical problem which had hitherto been regarded as insoluble in spite of the existing demand is solved in a practically perfect manner.

One embodiment of the invention and certain modifications thereof are illustrated by way of example in the accompanying drawing in which:

Fig. 1 shows diagrammatically the associating mechanism for the led-in web arriving from the printing machine and the supplements or enclosures coming from a winding-off reel.

Fig. 2 illustrates in a partially sectioned elevation a differential gear whereby the feed-speed of the supplements may be kept in accord with that of the led-in webs and

Figs. 3 and 4 are more or less diagrammatic elevations of two different constructional forms of optical arrangement for observing the gauged sections of the supplement or enclosure-web.

The paper webs 1 coming from the newspaper printing machine and properly associated or brought together are guided over a fold producer 2 and are then conducted through entry rolls 3 to cutting mechanism 4, 5 the cylinder 5 of which transfers them to an associating cylinder 6.

The supplement or enclosure web 11 drawn off from a winding-off reel and printed at some time previous, i. e., independently of the newspaper printing, is conducted over a fold producer 12 to a draw-roll pair 13 and through the latter to cutting mechanism 14, 15 whence the severed supplement sections are supplied by means of a band-device 17 to a feed cylinder 16 and by the latter to the above mentioned associating cylinder 6. After the as-

sociation of the supplement-sections with the newspaper-sheets the printed products are transferred by a delivery cylinder 7 to a delivery device 8.

5 Since the speed of unwinding of the paper roll 11 containing the supplements is not positively dependent in any way upon the speed of travel of the newspaper paper-web 1, consequently the feed speed of the supplements
10 must be capable of being supervised and regulated accordingly at any time.

The latter problem may be solved in many ways: For example, the winding-off roll for the supplements might be driven with a positive or force drive and its speed of driving
15 adapted to the printing speed of the newspaper with the aid of differential gears or by the control device of a separate driving motor.

20 The constructional example illustrated in the drawing is, instead of the above, based on influencing the winding-off speed of the roll by the action of the pair of draw rolls 13 and deriving the drive thereof in a regulable
25 manner from the drive of the printing machine. To this end the cylinder 15 of the cutting mechanism 14, 15 is positively driven from an adjacent shaft of the newspaper printing machine by means of a gear wheel
30 22 in a per se known manner and its rotation is transmitted by means of an intermediate gear wheel 23 to a gear wheel 24 which is loosely mounted on a shaft 27 and is rigidly connected through the intermediary of a hollow shaft 25 with a gear wheel 26 also loosely
35 mounted on said shaft 27. The latter wheel 26 meshes with a pinion 28 which is mounted on a gear wheel 29 mounted in turn, also in a loosely revoluble manner, on the shaft 27; this
40 arrangement enables the pinion 28 to ride around the gear wheel 26 in the manner of a planet wheel. The wheel 29 may be rotated through a pinion 30 by a hand crank 31 and when this device is not in use, it may be secured to the machine frame in its temporary
45 position in any appropriate fashion, for example by securing the hand crank 31. Instead of the hand crank 31, use might also be made of a non-return worm wheel gear or the
50 wheel 29 might be driven continuously or intermittently with the aid of a controllable motor.

The pinion 28, referred to above, is made so broad that it meshes not only with the
55 wheel 26 but also with a second gear wheel 32 which has one or two teeth more or less than said wheel 26. The result of this is that a slight relative displacement occurs between the wheels 26 and 32 as the pinion 28 rides
60 around the same. If, however, the toothed wheel 29 is locked in its temporary position, the driving movement of the toothed wheel 26 is transmitted through the pinion 28 to the toothed wheel 32. The latter is rigidly connected to the shaft 27 which in turn drives

the draw-in roll 13' through the toothed wheel gear 33, 34, 35. Thus the arrangement described enables the draw-in roll pair 13 to be driven through the intermediary of the cutting mechanism 14, 15 and thus also in dependency upon the operating speed of the newspaper printing machine, although in a controllable manner so that the drawing off speed of the paper roll containing the supplements may be determined.

70 There remains the problem of enabling the paper web 11 drawn off from the supplement roll to be observed in such a manner as to allow it to be readily determined at any time whether the cutting of the paper web 11 by the cutting mechanism 14, 15 is taking place at the correct point between the separate printed reproductions. With the high
75 operating speeds under consideration, this cannot be determined with certainty with the naked eye. For this purpose it would be necessary to open some of the finished discharged printed products in order to examine the supplements or enclosures which, however, is a considerable waste of time and also does
80 not allow of perfect supervision of the influence of adjusting or regulating measures adopted.

To enable better observation of the regular feed of the supplement web gauge marks
85 40 are printed, during the normal printing of said web, at the edge thereof, at a slight distance from the point at which the cutting is later to take place. Corresponding to these a counter-mark 41 is provided on the feed cylinder 16 by engraving or in some other fashion so that during proper cutting of the supplement web the gauge marks 40 provided on the supplement sheets come to lie in one line with the marks 41 furnished on the cylinder
90 16. Furthermore an optical observation device is mounted on said cylinder 16 whereby the gauge marks 40 and 41 may be observed with sufficient certainty in spite of the high running speed of the machine.

100 This object may be attained in the most simple manner by covering the end in question of the cylinder 16 by a hood such that, although the supplement parts can enter and leave the covered space, very little light only
105 can penetrate from outside. The covered space is then illuminated for a short instant during each rotation of the printing cylinder, in dependency on the running speed of the printing machine, by a lamp arranged in the interior of the hood so that the edge of the supplement-parts and the adjacent part of the surface of the cylinder 16 may be observed, through an opening in the hood, always in the position which they occupy for the short instant of illumination by the said lamp. On
110 account of the short period of the illumination these parts give the appearance of being stationary so that the marks 40 and 41 on the supplement sheet and the cylinder 16 respec-

tively may be observed with certainty and thus the feed speed of the supplement web 11 may then be modified as necessary with the aid of one of the above described alternative controlling arrangements, for example by means of the differential gear illustrated in Fig. 2.

Another form of observation device is illustrated in Figure 3. In this case a screening disc 42, which rotates with the cylinder 16 and has an opening 43 in the vicinity of the point at which the mark 41 is located on the cylinder 16, is secured to the end of the cylinder 16. In addition the disc 42 supports, in the vicinity of this opening 43, an optical lens system 44 through which the marks 40 and 41 may be observed in a satisfactory manner. The optical system 44 is so arranged that a virtual image of the marks 40 and 41 is formed in the axis of the cylinder 16. To allow of perfect observation of said marks, a continuously burning lamp 45 and also a screen 46 provided with an opening through which the observer looks, are provided on the machine frame in addition to the disc 42. Thus the gauge marks 40 and 41 are always seen when the opening 43 in the disc 42 passes the lamp 45 and the gauge marks 40 and 41 lie in one line with the optical system 44 and the opening in the screen 46. To simplify the observation of the gauge marks, it is recommended in this case also that the end of the cylinder 16 employed should have the light excluded as far as possible by the aid of a hood.

A further alternative for the observation of the gauge marks will now be explained by reference to Fig. 4: In this arrangement the trunnions 50 of the cylinder 16 are bored axially and furthermore a prism system 52, 53, 54 rotating with the cylinder and enabling the mark 41 on the periphery of said cylinder 16 to be observed is associated with the bore. The light issuing from a rotating lamp 51 is deflected after it has illuminated the adjacent parts of the cylinder 16 and the supplement-sheet, through the prisms 52, 53 and 54 into the axial direction of the cylinder 16 so that the illuminated parts may be observed with, for example, the assistance of a mirror 55. In order to bring the image to rest, a tube 56 in which a prism 57 and if necessary a lens 58 are located is mounted in the above-mentioned axial bore in the cylinder trunnion 50. The tube 56 is rotated together with the prism 57 and the lens 58 in the direction of rotation of the cylinder 16 but at half the rate of rotation thereof.

The above described examples do not exhaust all the alternative means for observing the gauge marks. It may be stressed in particular that the observation point may be removed from the cylinder 16 to other locations, for example to one of the cutting cylinders 14, 15 and even to the uncut paper web of the

enclosure strip 11. In the latter case, it is to be recommended that the web 11 before it reaches the fold guide 12, should be carried around an observation cylinder, the periphery of which corresponds to the size of the separate enclosure sheets. It is then possible, with the aid of a lamp, such as that above described, which lights up periodically during each rotation of the printing cylinder of the newspaper printing machine, to observe the paper web 11 in relation to a mark provided, in the vicinity thereof, on the machine frame and to regulate the feed speed of the supplement web accordingly.

However the latter speed may be determined, it gives in every case a reliable indication in what measure and in what direction the device for controlling the feed of the supplement sheets should be operated to effect correction. If said sheets arrive too rapidly and their gauge marks 40 outstrip those on the printing machine, for example the gauge marks 41 provided on the cylinder 16, then the feed speed of the enclosure sheets must be decelerated and in the opposite case, must be accelerated. Accordingly, with the differential gear illustrated in Figs. 1 and 2, the hand crank 31 must be released from its locked position and rotated in the one or other direction; it will be seen that the desired purpose may be attained in a simple and ready fashion.

What I claim is:—

1. For maintaining register between a moving web and a second web with which the first is to be associated, an arrangement comprising in combination, gauging means on said arrangement adapted to cooperate with complementary gauging means on said first mentioned web, an observation device for ascertaining the in or out of register relation between said two gauging means and adjusting means for readily modifying the feed of the first mentioned web.

2. For maintaining a web in register with a second web with which it is to be associated, an arrangement comprising driving means for the feed of the latter web, driving connections for transmitting a drive from said means to the feed of the first mentioned web, an adjusting device whereby said drive may be modified to vary the feed of said first mentioned web, gauging means on said arrangement adapted to cooperate with complementary gauging means on said first mentioned web; and observation means for determining the in or out of register relation between said two gauging means.

3. For maintaining a printed paper web in register with another web for the purpose of ensuring proper association of sheets to be subsequently cut therefrom, an arrangement comprising an adjustable driving device for the first mentioned web, gauging means provided on a cylinder around which

said web, furnished with complementary gauging means, is passed and an observation device for ascertaining the relation between said gauging means.

- 5 4. For feeding a paper supplement web in proper register from a winding-off reel to a printed product arriving from a printing machine, an arrangement comprising in combination adjustable feeding means and cutting
10 means for said web, an associating device for combining the supplement with said printed product, gauging means on one of the elements of said feeding and cutting means and an observation device for deter-
15 mining the relation between said gauging means and complementary gauging means on said web.

5. For feeding a paper supplement web in proper register from a winding-off reel
20 to a printed product arriving from a printing machine, an arrangement comprising in combination adjustable feeding means and cutting means for said web, an associating device for combining the supplement with
25 said printed product, gauging means on a cylinder of said feeding and cutting means and an observation device for determining the relation between said gauging means and complementary gauging means on said web,
30 said observation device comprising a lamp for periodically illuminating said gauging means and a rotary objective piece for projecting a virtual image thereof in the axis of rotation of said cylinder.

- 35 6. For maintaining a printed paper web in register with a second web for the purpose of ensuring proper association of sheets to be subsequently cut therefrom, an arrangement comprising in combination with adjust-
40 able driving means for the first mentioned web, a cylinder over which the same is fed and having a size in simple relationship to the printing cylinder, gauging marks provided on the former cylinder and means for
45 determining the condition of said marks in regard to complementary gauging means on the first mentioned web, said gauging means remaining in useful contiguity or association with each other over a wide angular range.
50 7. A device as per claim 2, in which said driving connections comprise differential gear adapted to transmit the drive of the second web to said first mentioned web.

8. In a device as per claim 3, in which said
55 observation means include a rotary optical prism system for the deflection of said observation means along the axis of the cylinder and an oppositely rotating prism adapted to bring the observed image to rest.

- 60 In testimony whereof I affix my signature.
OTTO WOHLRABE.