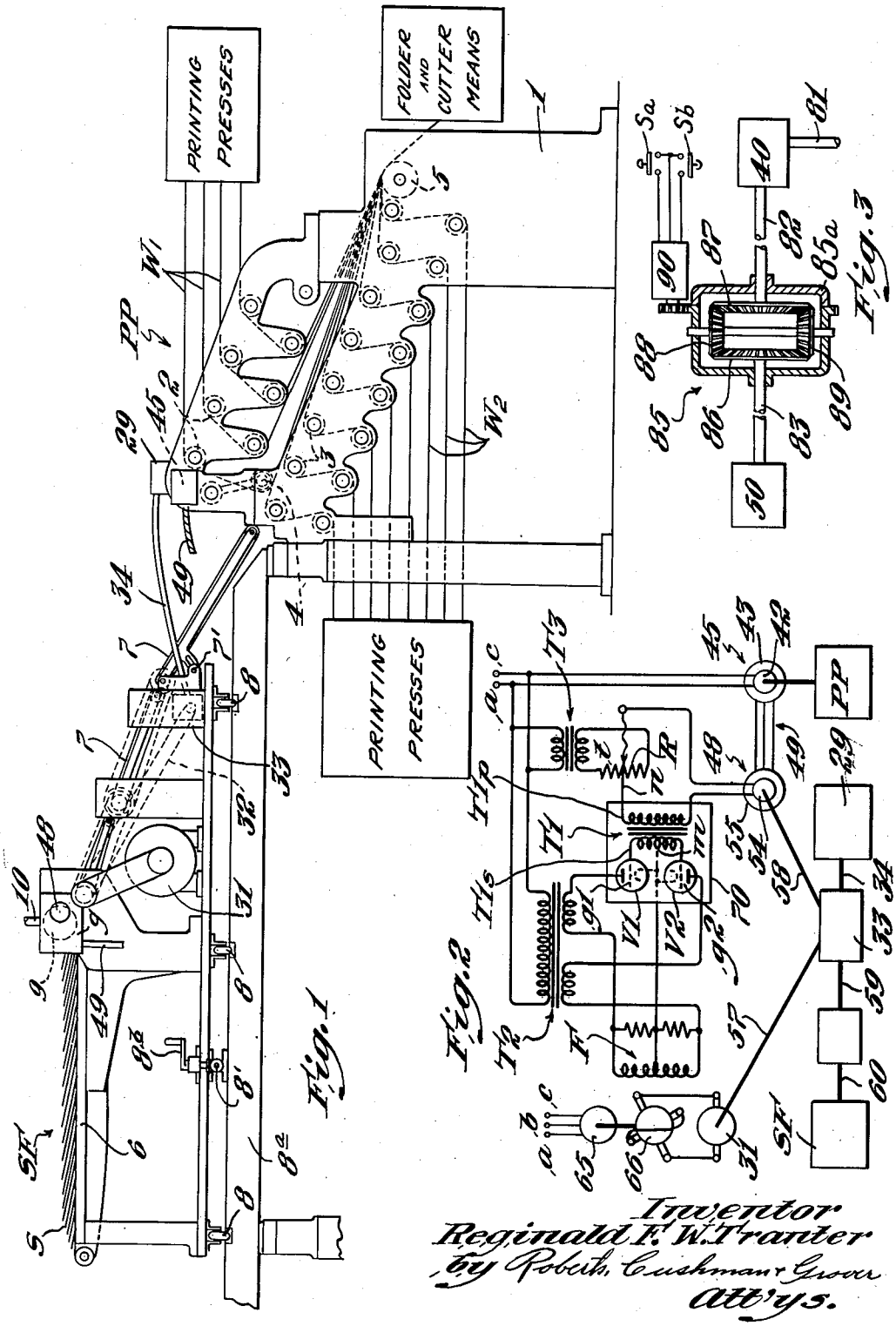
June 10, 1952 R. F. W. TRANTER 2,600,284

APPARATUS FOR INSERTING SUPPLEMENTARY SHEETS IN NEWSPAPERS AND THE LIKE

Filed March 1, 1947 3 Sheets-Sheet 1



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APPARATUS FOR INSERTING SUPPLEMENTARY SHEETS IN NEWSPAPERS AND THE LIKE

Filed March 1, 1947 3 Sheets-Sheet 2

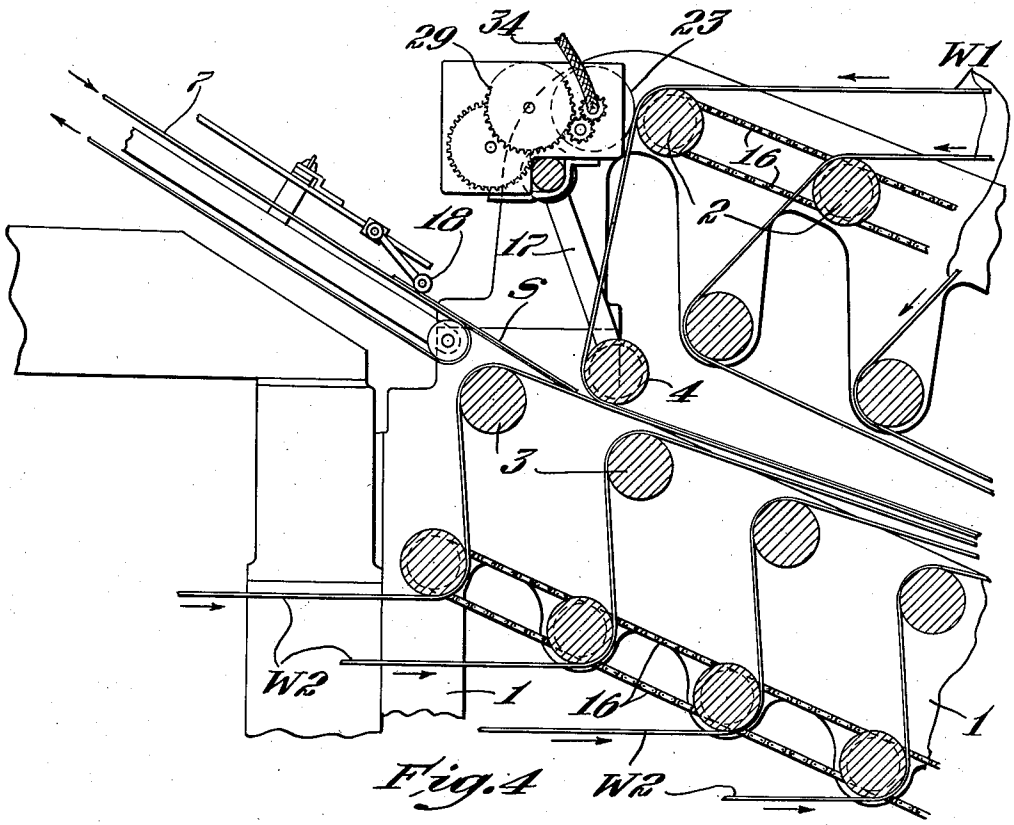


Fig. 4

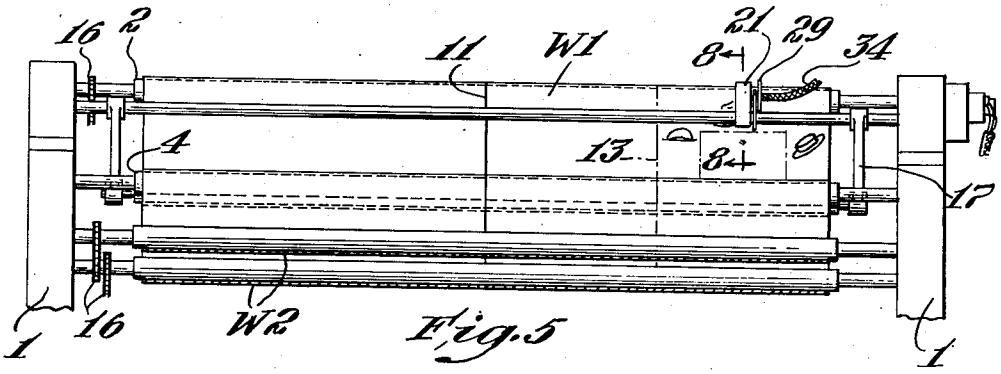


Fig. 5

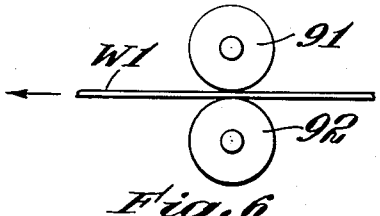


Fig. 6

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APPARATUS FOR INSERTING SUPPLEMENTARY SHEETS IN NEWSPAPERS AND THE LIKE

Filed March 1, 1947 3 Sheets-Sheet 3

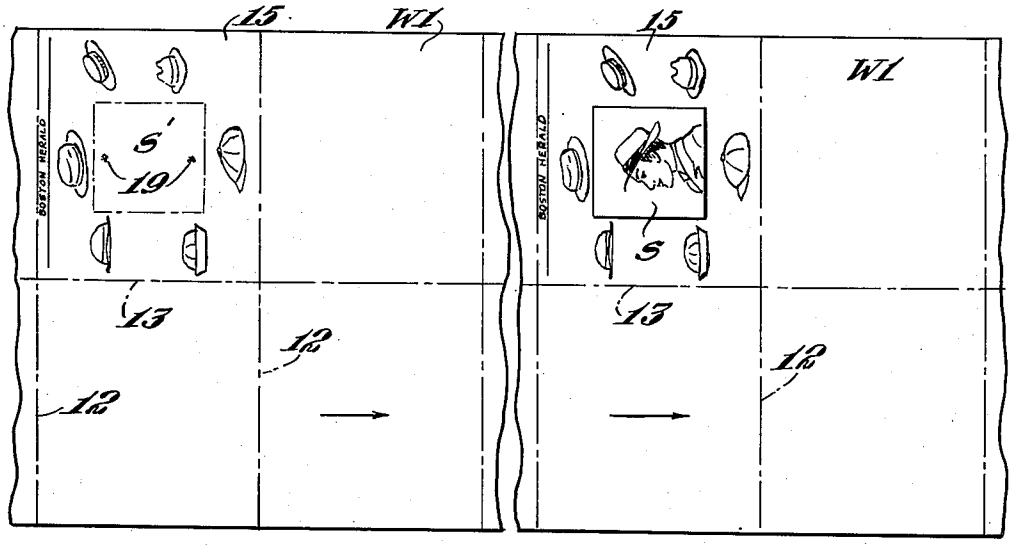


Fig. 7

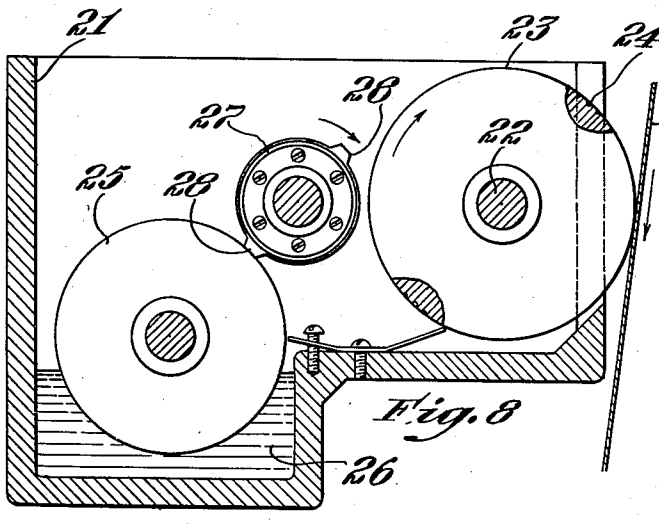


Fig. 8

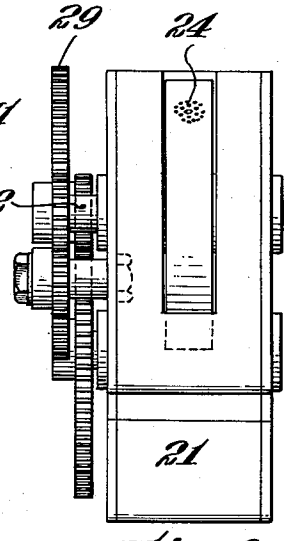


Fig. 9

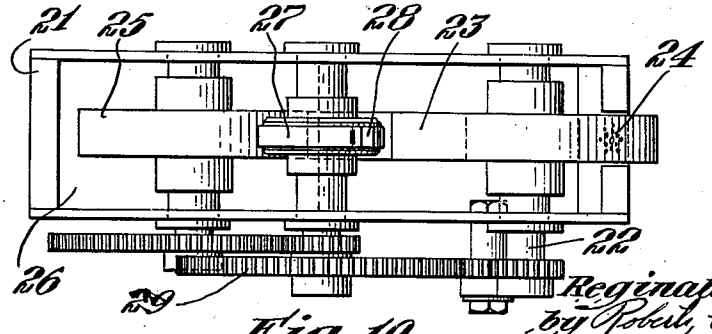


Fig. 10

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UNITED STATES PATENT OFFICE

2,600,284

APPARATUS FOR INSERTING SUPPLEMENTARY SHEETS IN NEWSPAPERS AND THE LIKE

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Application March 1, 1947, Serial No. 731,763

3 Claims. (Cl. 270—52)

1

In the production of newspapers it is often desirable to produce a product that includes a printed supplement which may be a picture of one or more colors, a portrait, readable matter of particular interest, or any other article that will immediately attract attention of the reader, thus serving alone or in conjunction with the printed matter on an adjoining page of the newspaper as an advertising or other medium of considerable value. The supplement may be in the form of a single sheet or a folded sheet of the same size or smaller than the newspaper and of a different color and quality of paper, and it may be loosely inserted between certain pages of the newspaper or pasted on a particular page, thereby forming either a removable or a permanent part of the newspaper. If desired the supplement may be framed with a line or design printed on the newspaper web. While the invention is particularly useful in the newspaper field it may also be used with webs other than newsprint.

One object of this invention is to produce a newspaper or similar product of the above character without substantially increasing the cost of production and without changing the basic construction or operation of the printing press.

In one aspect the present invention involves a method of applying sheets to a traveling web, at points spaced at regular intervals lengthwise of the web, which comprises continuously feeding the web along a predetermined path, successively delivering the sheets to the web at one location along the path with the sheet deliveries timed recurrently to place the sheets at the aforesaid points with spaces between successive sheets, and at the aforesaid location pressing the contacting areas of the sheets and web together.

In another aspect of the invention the supplementary matter is printed on relatively small sheets, that is sheets smaller than a newspaper page, and as the webs of newsprint feed thru the printing press the small sheets are successively applied to recurrent areas of the webs spaced longitudinally of the webs at intervals depending upon the size of the pages and the method of printing, the intervals being a multiple of the dimension of the pages lengthwise of the webs so that successive sheets are applied to corresponding areas of recurrent pages, these areas preferably being unprinted. In the so-called straight method of printing, where successive page lengths of a web are printed with the same subject-matter, the aforesaid interval is one; and in so-called collect printing, where successive page lengths are printed with different subject-matter to form different pages, the intervals are greater than one.

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In still another aspect the present invention involves synchronizing the sheets with the web, adjusting the position of the sheets lengthwise and crosswise of the web so that they are deposited on predetermined areas of the web, and pressing the contacting areas of the sheets and web together. Preferably the sheets are fed to the web approximately in the direction the web is traveling and at approximately the same speed. The means for pressing the sheets and web together preferably comprises a guide for the web and a belt or other web passing over the guide with the sheets between the two webs. The space on the side of the webs opposite the guide should be unobstructed so that the paths of the webs past the guide are controlled solely by the guide. To make the sheets adhere to the web, adhesive is applied to one of each pair of contacting areas, that is, to the web or to the sheets, before they are pressed together. While thermoplastic adhesive may be applied to the sheets before they are fed to the web, the sheets then being caused to adhere to the web by a heated roller in the press, it is preferable to apply liquid adhesive to the sheets or web, preferably the web, as the web and sheets are fed together.

In another aspect the invention involves feeding the sheets along a series of conveyors and driving each conveyor at a speed greater than that of the next preceding conveyor, the direction of movement and speed of the last conveyor of the series approximating that of the web, thereby gradually to accelerate the sheets until they have about the same speed as the web. The apparatus for thus accelerating the sheets comprises a series of conveyors, each conveyor feeding the sheets to the next succeeding conveyor and the last conveyor feeding the sheets to the web, and kinematic connections for driving the conveyors at different speeds, each conveyor moving faster than the next preceding conveyor and the direction of movement and speed of the last conveyor approximating that of the web.

In a more specific aspect the method involves feeding the web over two spaced guides, deflecting the path of the web from the first to the second guide, with a third guide intermediate the two guides, and successively feeding the sheets between the web and intermediate guide, a second web preferably being fed between the sheets and guide. When using two webs they are preferably fed together in face to face relation along con-

verging paths with a crotch therebetween and the sheets are fed into the crotch to be attached to one of the webs.

In still another aspect the invention involves newspaper apparatus comprising means for printing the traveling web, means for slitting or dividing the web into two or more smaller webs, means for guiding the various webs to form predetermined combinations of certain sections, and means for collating, folding and cutting these traveling webs into sections. While the sheets may be fed to the web at any location in advance of the folder, they are preferably fed to the web between the printer and cutter. Preferably the web is fed along its predetermined path by means of rollers, some of which are driven and some of which may be idlers. In the preferred embodiment the adhesive is supplied to the web by an applicator associated with the printing press, but the applicator is driven in unison with the sheet feeder. In this way the adhesive is applied to the proper areas of the web notwithstanding cumulative slippage between the web and its drive rollers.

For the purpose of illustration typical embodiments of the invention are shown in the accompanying drawings in which

Fig. 1 is a side elevation indicating parts of the printing press diagrammatically;

Fig. 2 is a circuit diagram of the synchronizing apparatus;

Fig. 3 is a diagram of modified synchronizing means;

Fig. 4 is a vertical longitudinal section showing the juxtaposed parts of the sheet feeder and the printing press;

Fig. 5 is an elevation of the upper portion of the printing press, viewed from the left of Fig. 4;

Fig. 6 shows a modification in which the synchronizing driver is actuated by the web instead of directly by the printing press;

Fig. 7 is a plan view of a web of newsprint showing a printed page before and after a sheet has been applied thereto;

Fig. 8 is a section of the cement applicator taken on the line 8—8 of Fig. 5;

Fig. 9 is an end elevation of the applicator; and

Fig. 10 is a top plan of the applicator.

The particular embodiment of the invention chosen for the purpose of illustration comprises a web printing press PP and a sheet feeder SF separately driven by separate motors. The printing press comprises a frame 1 in which rollers are journaled for guiding webs of newsprint through the press. Two of the webs are designated W1 and W2, and certain of the rollers are designated 2, 3, 4 and 5. The webs come to these rollers from printing and slitting mechanism and they pass on over these rollers to formers and nipping rolls which form the longitudinal fold and thence to a combined collating, cutting and folding mechanism which cuts the longitudinally folded webs into page lengths, collates the cut off pages into required sections and folds them transversely to form finished newspapers. Inasmuch as the printing, cutting and folding mechanism may be of any well-known construction these groups of mechanism are designated diagrammatically in Fig. 1 as printer, cutter and folder, respectively.

The sheet feeder SF comprises a feed table 6 forming a magazine upon which the insert sheets S are stacked with the printed side down in the form of a fanned out bank, a series of sets of

traveling belts 7 for delivering the sheets to the printing press at regularly recurrent intervals and at a surface speed substantially equal to that of the webs W1 and W2, and a rotary suction feed drum 9 for feeding the sheets one by one from the stack to the traveling belts synchronously with the operation of the printing press, the drum 9 being connected to a vacuum pump through a pipe 10 and adapted to feed one sheet during each revolution thereof. The last set of belts 7 next to the printing press is adjustably mounted at 7' so that the path of the sheets may be aimed accurately at the crotch between the webs W1 and W2. Associated with the belts 7 are adjustable pressure rollers 18 which are arranged transversely in pairs to hold the sheets in contact with the belts (Fig. 4). These rollers are distributed along the belts so that at least one roller is in engagement with each sheet at all times. Inasmuch as this feeding mechanism may be of well-known construction it need not be described in greater detail for the purpose of this disclosure.

In order to adjust the position of the sheets edgewise of the web thereby to enable delivery of sheets to any page position in any one of a series of foliated webs, the sheet feeder is mounted on rollers 8 which run on transverse tracks (Fig. 1). Any suitable means may be employed to propel the sheet feeder sideways into adjusted position and to hold it there. As shown in Fig. 1 a lead screw 8' engages a nut fast to the bottom of the sheet-feeder, the screw being journaled on the support 8^a and being operated through beveled gears by means of a crank 8^b. Thus rotation of the lead screw moves the sheet-feeder frame edgewise of the webs in the press. While the friction of the interengaging parts is sufficient to hold the feeder in adjusted position, a positive lock may be provided if desired.

As shown in Fig. 5 the illustrated press is wide enough to accommodate a web of paper four pages wide, the web being split at 11 into two webs each two pages wide while passing thru the press after printing. As indicated in Fig. 7, after being printed, the double page sections are folded about the longitudinal central line 13 and are cut off in page lengths at the transverse lines 12. As also shown in Fig. 7 the insert sheets S are applied to blank spaces S' in the middle of one page of each newspaper, this page being designated 15 in the figure. In straight printing the pages 15 to which the sheets are applied would follow each other consecutively, whereas in collect printing, as shown in Fig. 7, they would be spaced apart a distance depending upon the number of pages in the paper.

As shown in Fig. 4 the upper and lower rows of rollers are driven by sprocket chains 16 whereas the intermediate rollers are idlers, but of course the driven rollers may be actuated by gears or other suitable means instead of chains. The web W1 feeds over roller 2 and thence over roller 4 to roller 5. Web W2 feeds over roller 3, thence under roller 4 and thence over roller 5. Roller 4 is mounted on adjustable arms 17 and the arms 17 are so adjusted that the portion of web W2 extending from roller 3 to roller 5 is slightly deflected by roller 4 from a straight path. Thus the sheets S which are fed into the crotch between the converging portions of the webs W1 and W2 are pinched between the two webs at the roller 4.

As shown in Fig. 4 the space below the webs opposite the roller 4 is unobstructed. This permits the adjustment of the roller 4 to vary the amount the web W2 is deflected, thereby to vary the degree of pressure with which the sheets S are gripped as they are picked up by the two webs. It also avoids variation in this pressure due to variations in the thickness of the webs or the sheets. The last pair of rollers 18 of the sheet feeder SF is located so that each sheet leaves it at approximately the instant it is pinched between the two webs or slightly sooner or slightly later.

In the illustration the sheets S are attached to the web W1 by two spots of adhesive 19 for each sheet (Fig. 7). These spots are applied to the web W1 by the device shown in Figs. 8, 9 and 10. This device comprises a casing 21 which is open at the top and front and which is adjustably mounted on the press frame 1 for movement edgewise of the web W1 to apply adhesive to a selected page at a predetermined point thereon. Journaled in the casing on a shaft 22 is an applicator roll 23 which is driven at a surface speed equal to that of the webs and is provided with one or more groups of indentations 24 at suitably spaced intervals around its periphery to receive liquid adhesive, the roll projecting out through the open front of the casing to contact the passing web W1 (Figs. 4 and 8). Adhesive is applied to the groups of indentations by means of a roller 25 dipping into a pool of adhesive 26 and an intermediate roller 27 having rubber protuberances 28 which pick up adhesive from the periphery of roll 25 and transfer the adhesive to indentations 24 on the roll 23. The three rolls 23, 25 and 27 are driven in unison by gearing 29.

As shown in Fig. 1 the sheet feeder SF is driven by a motor 31 and, in order to deposit the spots of adhesive 19 on the same spaces S' of the web W1 as the sheets S are later to be applied, the cement applicator is also driven from the motor 31 through a belt 32, a gear box 33, a flexible drive shaft 34, and the aforesaid gears 29. Thus as the phase relationship between the sheet feeder and the printing press is adjusted as hereinafter described, to vary the position of the sheets lengthwise of the web, the phase relationship between the cement applicator and the printing press is correspondingly adjusted. It will be understood that a similar adhesive applicator may be used in connection with the web W2 whereby the insert sheets S may be attached to said web and to a different page of the newspaper, as desired. In this case the insert sheets are loaded on the sheet feeder and fed printed side up.

In order to apply the sheets S to the proper areas S' of the web, it is necessary to synchronize the sheet feeder with the printing press, particularly because of variations in the stretchability of the webs throughout their length and the cumulative slippage effect of the webs on the rolls of the printing press. This can be accomplished by gearing the two machines together mechanically with means permitting phase control. However, according to the preferred embodiment of the invention the delivery of the sheets S is kept in accurate phase relationship with the areas S' on the web by means of the Selsyn synchronizing and registering drive diagrammatically shown in Fig. 2 or another similar synchronizer of the same electronic servo type. This type of synchronizer is superior for the reason that it permits ready adjustment of the sheet feeder edgewise of the web, thereby to regulate the position of the sheets edgewise of the web. It is also advantageous in that it lends itself to remote control from the location where the papers are delivered from the press for inspection.

The aforesaid synchronizing apparatus comprises a driver 45 associated with the printing press PP and a follower 48 associated with the sheet feeder SF, the follower being electrically connected with the driver thru flexible conductors 49 which freely permit relative movement of printer and sheet feeder units PP and SF. In order to permit adjustment for two different speed ratios respectively, one for straight printing and the other for collect printing, the follower 48 is connected to the feeder by means of the change speed drive *g* further discussed below. The driver 45 comprises a rotor 42 and a stator 43 and the follower 48 comprises a rotor 54 and a stator 55. The driver rotor 42 is supplied with alternating current from a source of alternating current *a, c* and is driven by the printing press PP either directly or indirectly thru the web to which the sheets are applied.

The rotor 54 of follower 48 is mechanically connected to sheet feeder SF which is in turn driven by motor 31. These kinematic connections although actually involving other transmission elements such as belts are in Fig. 2 schematically indicated by shafts 57, 58 and 60 and gear box 33 which drivingly connects these shafts. Rotor 54 of follower 48 is connected to the next link of the synchronizing drive, namely transformer T1. This transformer T1 has a secondary T1*s* center tapped at *m* and connected to the control grids *g1*, *g2* of vacuum tubes V1, V2. The anode circuits of these tubes are supplied from the secondaries of a transformer T2 connected to the source *a, c* which also supplies the above-mentioned driver 45. The loads of the output circuits of the vacuum tubes are the complementary halves of a regulating or control field winding F of the generator component 66 of a precision speed regulating drive which may be of the so called Amplidyne type, and which includes in addition a motor 65 supplied from line *a, b, c*, and the above mentioned motor 31 driving feeder SF. The amplification network including tubes V1, V2 is in Fig. 2 diagrammatically indicated within block 70, various conventional circuit elements, such as auxiliary resistors and voltage regulators being omitted in order to simplify the drawing. These omissions are indicated by dotting the internal connections between tubes V1, V2 and secondary T1*s*.

The leads between the output component 54 of follower 48 and the primary T1*p* of transformer T1 contain a registering or phasing device of the following type. A resistor R with adjustable tap *t* is supplied with alternating current from source *a, c* through a transformer T3 and has a midpoint *n* leading to one terminal of primary T1*p*, whereas adjustable tap *t* is connected to rotor 55, whose other terminal leads to the second terminal of primary T1*p*. This registering device may be remotely arranged at a point permitting easy inspection of register between web and sheets.

The circuit arrangement according to Fig. 2 operates as follows: With printer drive or web and sheet feeder in synchronism there is a slight angular displacement between rotors 42 and 54 which supplies an error signal to primary T1*p*. This error signal is differentially applied to grids *g1* and *g2* and increases the conductivity of one, and decreases that of the other tube. The halves

of the control field F of generator 66 are correspondingly varied, the net excitation of the generator being just sufficient to furnish an output voltage which drives motor 31 at the same speed at which the press PP is driven. Upon speed deviation (assuming that adjustable tap *t* is set at a position corresponding to synchronism between the two drives for example at midpoint *n*) primary T1*p* induces in secondary T1*s* a voltage varying in one direction or the other depending upon the sense of deviation, which correspondingly changes the control potentials on grids *g1*, *g2* of vacuum tubes V1, V2 and the output currents of these tubes. The halves of field F balance each other to correspondingly different degrees, and the generator 66 responds by proportionately adjusting the voltage supplied to motor 31, whose speed changes until synchronism is restored.

If it is desired to regulate the phase relation of the two drives, for example for the above-mentioned adjustment to reestablish register disturbed by cumulative expansion or slippage of the webs on the rolls of the printing press, tap *t* is moved one way or the other, thereby impressing on primary T1*p* a voltage in the corresponding direction which (in the manner described above for the effect of disturbance of synchronism between the two drives) affects the control field F, causing motor 31 to lead or lag respectively, until the desired phase correction is attained and register between web and sheets restored, when tap *t* is returned into neutral position.

It will be understood that appropriate anti-hunting provisions of conventional nature will be applied in order to assure proper response of the inserted drive to the synchronizing and phase adjusting system.

So far as possible, the elements schematically indicated in Fig. 2 are denoted with corresponding numerals in Fig. 1.

Instead of the above described electrical synchronizing and phase regulating drive, a mechanical drive may be used, particularly for comparatively simple installations, as follows, referring now to Fig. 3. In this figure numerals 40 and 50 indicate printing press and sheet feeder, respectively. The printing press 40 may be driven through drive shaft 81, and drives in its turn the sheet feeder 50 through shafting 82, 83 and the phase shifting differential gear 85 which includes two main gear wheels 86, 87 and two planet gears 88, 89. The gear housing 85*a* in which are journaled the planet gears 88 and 89 is rotatable about the shafts 82 and 83 in either direction by means of a gear train driven by a reversible motor 90. The direction of rotation of the motor M is controlled in the well known manner by selective operation of the switches S*a* and S*b*. When the printing press 40 and the sheet feeder 50 are in synchronism the planet gears 88 and 89 act as ordinary idler gears transmitting motion from the main driving gear 87 to the main driven gear 86. If for any of the above described reasons, the phase relationship between the press 40 and the feeder 50 shifts, these units can be brought back into synchronism by the rotation of the housing 85*a* and therefore the planet gears 88 and 89 about the axis of the shafts 82 and 83. Depending upon whether the phase difference between the units 40 and 50 is a leading or lagging relationship, rotation of the motor M is controlled by proper manipulation of the switches S*a* and S*b* to rotate the housing 85*a* in such direction that the planet gears 88 and 89 either decrease

or increase the rotational speed of the driven gear 86 with respect to the driving gear 87 until the units 40 and 50 are again in proper synchronism whereupon the motor M is stopped. Although illustrated as manual push-buttons it is to be understood that the switches S*a* and S*b* may be operated automatically, for example by a photoelectric tube arranged to respond to any misalignment of the sheets 5 and the respective pages printed upon the web.

As indicated above, the motion of the synchronizing driver 45 may be derived from the printing press either directly or indirectly thru the web to which the sheets are applied. If it is desired to actuate the driver 45 by the web, which might require less adjustment and provide more positive correlation of the elements to be put into register, namely the web and the sheets, a take-off device such as indicated in Fig. 6 may be used. In this figure W1 is the web which is to receive the insert sheet, and 91, 92 are two rubber rollers mounted on opposite sides of the web to pinch the web and be driven without substantial slippage, one of the rollers actuating the rotor 42. Another way to drive the synchronizer from the web is to connect the driver 45 with one of the idler rollers of the press. This is preferable to connecting the driver to one of the driving rolls of the press because there is substantially no slippage between the web and the idler rollers.

The change-speed drive *g* associated with the sheet feeder permits adjustment of the feeder for two different speed ratios, one for straight printing and the other for collect printing. Accordingly, the change-speed means *g* is included in the drive for the suction drum 9, and in one position, i. e. for straight printing, it effects rotation of the suction drum at the surface speed required to deliver one sheet to each succeeding page printed on the web, and in the other position, i. e. for collect printing, it effects rotation of the suction drum at one-half speed so that one sheet is fed for every alternate page on the web. In each case, however, the surface speed of the conveyor belts 7 is maintained and not correspondingly changed so that the sheets will be delivered to the web at the surface speed of the latter and in timed relation with the pages printed thereon. In the illustration three sets of conveyor belts 7 are provided, each set delivering the sheets to the next succeeding set. As shown in Fig. 1 these conveyor belts are driven by motor 31 through a series of drive belts and pulleys, the ratio of the pulleys being such that each set of conveyor belts travels at a speed greater than that of the next preceding set. Preferably the ratio is such that the last set travels at the full speed of the webs of paper in the press, the next preceding set travels at three-quarters speed and the first set of conveyor belts travels at half-speed, the vacuum drum 9 bringing the sheets approximately to quarter-speed or half-speed (depending on the setting of the change-speed device *g*) in transferring them from the stack to the first set of conveyor belts.

From the foregoing it will be evident that according to the present invention sheets may be accurately applied to predetermined areas of a continuously traveling web notwithstanding cumulative slippage of the web on its driving rolls and notwithstanding the sheets are relatively small and are spaced apart lengthwise of the web at recurrent intervals.

It should be understood that the present disclosure is for the purpose of illustration only and

that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. For applying insert sheets at recurrent locations upon a moving web of newsprint, apparatus comprising a press for feeding the web along a predetermined path, a motor for driving said press to feed the web at press speed, a sheet feeder for sequentially presenting the sheets at a selected location in the path of the web including conveyor means for accelerating individual sheets to press speed, means for driving said sheet feeder and said conveyor means at an average speed which supplies sheets to said web at a predetermined spacing on the web, speed change means associated with said driving means to vary the said average speed, control means responsive to variations in the speed of said press to actuate said speed change means, so that the said average speed is normally maintained proportional to press speed, said control means further including manually operable means for adding and subtracting speed change increments, thereby to vary the average speed of said sheets relative to press speed so that said sheets are adjusted relatively to the web to bring them into register with said selected locations while the web is fed at press speed.

2. For applying insert sheets at recurrent locations upon a moving web of newsprint, apparatus comprising a press for feeding the web along a predetermined path, a motor for driving said press to feed the web at press speed, a sheet feeder for sequentially presenting the sheets at a selected location in the path of the web including conveyor means for accelerating individual sheets to press speed, means for driving said sheet feeder and said conveyor means at an average speed which supplies sheets to said web at a predetermined spacing on the web, speed change means associated with said driving means to vary the said average speed, control means responsive to variations in the speed of said press to actuate said speed change means, so that the said average speed is normally maintained proportional to press speed, said control means further including manually operable means for adding and subtracting speed change increments, thereby to vary the average speed of said sheets relative to press speed so that said sheets are adjusted relatively to the web to bring them into register with said selected locations while the web is fed at press speed, an applicator for applying adhesive on the web at said recurrent locations, and a coupling between the sheet feeder and applicator for driving the applicator at a speed proportional to said average speed and operating to change location of adhesive on the web when the location of the sheets is changed as aforesaid, so that said adhesive is always covered by the sheets.

3. For applying insert sheets at recurrent locations upon one of two superposed moving webs of newsprint, apparatus comprising a press for feeding the webs along a converging path, a motor for driving said press to feed the webs at press speed, a sheet feeder for sequentially presenting the sheets at the location where the webs converge including conveyor means for accelerating individual sheets to press speed, means for driving said sheet feeder and said conveyor means at an average speed which supplies sheets to said web at a predetermined spacing on the web, an applicator for applying adhesive on the web at said recurrent locations, a roll for pinching the webs together to bring the sheets into forcible contact with the adhesive, a coupling between the sheet feeder and applicator for driving the applicator at said sheet feed rate and operating to change the location of adhesive on the web when the location of the sheets is changed as aforesaid so that said adhesive is always covered by the sheets, speed change means associated with said driving means to vary the said average speed, control means responsive to variations in the speed of said press to actuate said speed change means, so that the said average speed is normally maintained proportional to press speed, said control means further including manually operable means for adding and subtracting speed change increments, thereby to vary the average speed of said sheets relative to press speed so that said sheets are adjusted relatively to the web to bring them into register with said selected locations while the web is fed at press speed.

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