This invention relates to mechanisms for delivering sheet material, and to a system for selectively effecting so-called front or rear delivery. The invention is illustrated and described by reference to one particular type of printing and developing machine, but it is to be understood that it applies to all machines of that type and of similar nature, either for printing, developing, or for both.

It is an object of the invention to devise mechanism for readily shifting delivery of sheet material from one direction to another, for example, shifting from front delivery in the machine to rear delivery, and vice-versa.

It is a further object of the invention to devise mechanism which shall be a part of conveying means for advancing printed or developed material and which shall function upon change of position or upon shifting certain guiding mechanism over which some portion of the conveying means travels.

A further object of the invention is to devise conveying means and shifting means therefor which shall function effectively to direct delivered, printed material selectively in either direction, but which shall have no adverse effect upon the said material, such as a tendency to wrinkle or to scratch or otherwise damage its sensitized surface.

It is a further object to effect front and rear delivery of printed or developed material by mechanism shiftable during operation of the machine so long as change of position is made between two consecutively delivered sheets.

It is a further object of the invention to construct a front and rear delivery mechanism which shall be adjustable in one position for a purpose hereinafter to be more thoroughly described.

It is a further object of the invention to provide a sheet delivery means which shall take advantage of the condition of the material and its natural tendencies to curl away from the side to which the developing vapors are applied.

Other objects of the invention will be apparent from the following description of one preferred embodiment of the invention and certain modifications thereof.

In machines for printing and/or developing sheet material, such as sensitized diazo-type papers and the like, delivery of the material is sometimes more conveniently effected at the front of the machine, especially for smaller sized sheets, and at other times, as with larger sheets, delivery at the rear of the machine may be more desirable. Heretofore, it has been possible to effect delivery at either the front or rear of such machines, but to change from one to the other, it has generally been necessary to stop the machine and to effect a change of certain parts whereupon the machine may be restarted and delivery will thereafter be effected in accordance with the desires of the operator. To change back to the original direction of delivery requires similar stopping and substitution of appropriate parts. According to the present invention, certain of the conveying means by which the material is advanced through the machine at a predetermined rate are guided or passed about means including rollers, one of which is preferably driven and which are shiftable as to their position. The shifting of position for these guiding rollers has no noticeable effect on their driving mechanism which is positively operable at all times.

When the shiftable means hereinafter to be described in detail occupies one particular position, the material will be delivered in one direction, e.g., to the front of the machine. Upon shifting said means to its opposite or other extreme position, it then becomes effective in conjunction with certain supplementary conveying devices which have become engageable with the delivered material, to alter the course of the material and to deliver it in the opposite or some other direction, e.g., toward the rear of the machine.

By providing a mechanism in which the direction of travel for the sheet material advancing and guiding means is selectively caused to assume either a straight line direction or a curved direction, advantage is taken of the condition of the material. Sensitized material, such as employed in these machines, has a definite tendency to curl away from the side to which the developing vapors are applied. While the process is termed a "dry development," the material is, of course, actually in contact at one side with the developing vapors. The term "dry" is a relative one and there is present during the development a degree of humidity necessary to insure proper chemical reaction. The humidification of the sensitized material is confined to one side and is so slight that, for all practical purposes, the material may be considered dry after passing a few feet from the region of application of the vapor.

As a result of the tendency to curl, the sheet material tends to cling to the conveying means at its dry side. By radically changing direction of travel at the delivery point, the material is
positively and forcefully caused to turn and to project from the machine rather than to follow the conveying means. Furthermore, the change of direction breaks the adhesion between the material and conveyors thereby obviating the tendency to resist discharge otherwise prevailing.

At rear delivery the conveying system travels in a relatively unchanging path at the front delivery point taking advantage of the tendency of the treated material to curl and to clump. At the point of rear delivery the material has dried and is separated from the conveying belts quite easily. No air jets, suction or mechanical pick-off means need be used at any point.

The invention will be described in greater detail by reference to the accompanying figures of drawing, in which:

Fig. 1 is a section through a machine to which the invention has been applied, only so much of the machine being shown as is essential to illustrate the principles of the device.

Fig. 2 is a detail and a more enlarged scale showing the mechanism in position to deliver toward the rear of the machine.

Fig. 3 shows a modification of the device, the full-line position corresponding to front delivery, while the dotted-line position of certain parts is that which gives the rear delivery.

Fig. 4 is a second modification, the general arrangement being similar to that of Fig. 3 except that the development of the sensitized material is accomplished directly in contact with a developing chamber, whereas that of Fig. 3 employs an intermediate member.

Fig. 5 is a detail view showing driving parts at the left-hand side of the machine.

Fig. 6 is a section through part of the machine showing driving elements and other movable parts incidental to control.

Fig. 7 is detail view of driving elements at the right-hand side of the machine.

Now referring to Fig. 1, part of a combined printing and developing machine has been illustrated, only the upper or developing section being shown. It is to be understood that the invention may be employed in any machine of this type and that details of it development or after printing, and that it is not necessary that both functions be performed in the same machine. The invention will be described by reference to one well-known machine having an outer casing generally indicated by numeral 10, a developing tank or chamber 11 in which ammonia vapors are vaporized and through openings in which said vapors pass to engage the sensitized surface of the material.

According to one form of such machine, the sensitized material is conveyed between a chain or link-type belt 52 and that belt impregnated sealing sleeve 13. The sealing sleeve passes about rollers 14, 15, 16, and 17. The roller 17 is positively driven in a manner hereinafter to be described, and the sleeve 13 is maintained under sufficient tension so that it is positively advanced at a predetermined speed in accordance with requirements for the particular machine, sensitized material, and other pertinent factors. The chain or other belt 12 is guided about the rollers 18 and 19 and is positively driven by the roller 13.

A tray 59 at the front of the machine receives the sensitized material or other material delivered by so-called “front delivery.” An opening at the front, upper part of the casing permits the operator to remove these prints at desired intervals. At the back of the machine, a table or other extension 21 is in position to receive printed matter delivered by so-called “rear delivery.”

Now referring to Figs. 1, 2, and 6, the roller 16 is carried by a shaft 22 fixed against rotation, but on which the roller is free to turn. This shaft 22 also serves for pivoting the arms 24 and 25 which carry additional spindles upon which certain driving gears and other elements are to rotate in the same path. The part is counterbalanced by the weight 26, while arm 25 and attached mechanism are counterbalanced by a similar weight 27. At the outer or free end of arms 24 and 26, a shaft 29, on which is fixed the roller 17, is pivoted.

A gear 28 having fixed thereon the sprocket 30 is freely rotatable on the spindle 22 and is driven by a chain, part of which is illustrated at 31 and which is in turn driven at a predetermined timed relationship to other parts of the machine. Power is taken from another sprocket on some other positively rotated element. Shaft 28 has a gear 32 fixed thereto and rotated by the gear 29 through an idler 33 rotatable on the short spindle 34 intermediate the ends of arm 24. As the structure carried by arms 24 and 25 is tipped or swung about its center, that is, about the shaft 22, the spindle 28 is caused to revolve.

One series of such tapes designated by numeral 42 passes about the roller 41 and about other rollers 43, 44, and 45. These tapes bear against the top side of the sealing sleeve 13, and material to be delivered at the rear of the machine is guided and advanced between these tapes and the free end of the arcuate member 45 having a lip 47 which is of such shape and so located above the table 21 that material projected therefrom will be stacked or piled in a predetermined sequence.

This shaft 49 is driven through a number of gears, but the drive is primarily taken from the left side of the frame to the right by shaft 25 driven as above described and which has fixed at its right-hand end a gear 46. This gear meshes with and drives an idler 42 pivoted intermediate the ends of the arm 25, which in turn drives a gear 56 freely rotatable on the shaft 22. This gear 56 is functionally integral with a larger gear 51 which meshes with and drives a smaller gear 52 of the machine.
thereto the roller 18, the function of which was described above.

The drive is carried through the gear 50 to shaft 45 through a pair of idlers 53 and 54, the latter of which meshes with a pinion 55 fixed at the end of shaft 45. It can be seen that the swinging of the arms 24 and 25 merely carries with them gears 48 and 49 at the right side of the frame, and the gears 32 and 33 at the left, this having no effect on the drive for the shaft 25 nor for the driving of the shafts on which the rollers 18 and 41 are carried. In Fig. 7, the dotted-line illus.

bracilen the arms and guide means about which the sealing sleeve passes are their position for front delivery while the full-line position is that occupied when the device is delivering material at the rear of the machine.

Another set of tapes or belts 56 is also driven by the roller 41, these tapes being staggered or spaced between the tapes 42. They also pass about rollers 57 and 58 which are freely pivoted in swinging brackets generally indicated by numeral 55. These brackets are constituted by arms which extend between the pivots or rollers and projections 65 and 61 between which is a slot 62 bearing upon rollers or other circular elements adjacent the ends of the shaft 26. When the arms 24 and 25 are swung to different positions as described above, the brackets 59 are moved to and from the positions of Figs. 1 and 2. The cam action of the rollers at the ends of shaft 26 as they function in the slots 52 causes such movement.

The tapes 56, when the brackets are in the position of Fig. 1, have no effect on the material discharged from the machine, although they may be continuously driven by the roller 41. Their motion is at that time merely an idle one. As the sheet material issuing from the developing chamber, or from a printer or other similar device, leaves the chain belt 12 and the sealing sleeve 13, it is discharged forwardly and somewhat downwardly as shown in Fig. 1 and will, upon release, drop into the tray 25. If continuous strip material is being printed or developed, the operator may roll it as it issues from the machine or dispose of it in any other satisfactory manner, the function of the mechanism itself being as described above.

When the parts are moved to the position of Fig. 2 (rear delivery), the arms 24 and 25 are moved to their uppermost position, thereby straightening the end of the sealing sleeve so that it leaves or recedes from the chain belt 12 at an earlier point, considering the advance of said belt about its driving roller 18, than in the event of front delivery. At the same time, the movement of the brackets 59 to the position of Fig. 2 causes the tapes 56 to assume an active position wherein they form more or less a continuation of the chain belt and follow along with the sealing sleeve from the point where the sleeve recedes from belt 12 to a point somewhat more than 90° about the roller 17. In this position, material being advanced between the belt 17 and sleeve 13 is influenced by the tapes 56 so that it is guided between these tapes and the sleeve, passing up about roller 11, or more correctly, with the sleeve, being guided about that roller, until caught by the tapes 42. Such material is then carried down by the tapes 42 and sleeve 13 to be caught by the arcuate guide 46 and discharged on to the table 21 at the rear of the machine.

Now referring to Fig. 3, a modification is shown wherein the arms and guide means about which the sealing sleeve passes are not bodily movable, but wherein the change from front to rear de-

livery and vice-versa is effected by swinging of a single roller about its center pivot which is also a pivot for a tape driving roll. The modification furthermore differs in that it is not essential to provide a series of tapes in addition to those longer tapes which pass down and back toward the point of rear delivery. One set of tapes serves two functions.

The showing in this Fig. 3 is limited to such elements as are different from those of the previous and preferred embodiment described. Here a tank 63, chain belt 64, and all function similarly to corresponding parts previously mentioned except that the sealing sleeve is guided by rollers 65 and 67 pivoted in arms 66, the roller 67 preferably being driven. Since there is no necessity for swinging or otherwise moving these parts, the drive for roller 67 may be direct, thereby providing for no relative movement and cooperating driving gears between the rollers 65 and 67.

A plurality of tapes 69 pass over a roller 70, then about a second roller 71 and a movable roller 72. These rollers 71 and 72 are carried by arms 73 which pivot about the center of roller 71. The roller 72 may be driven by means similar to that described with respect to rollers 16 and 17, Figs. 1 and 2, but it is preferred to drive these tapes by one of the other rollers, such as roller 70 or a roller at the back of the machine (not shown) but similar to the roller 64, Fig. 1. In fact, it is sufficient for these tapes to be driven by frictional contact with the sealing sleeve which is positively driven.

The position of the roller 72 is altered by any convenient hand-manipulated control, such as an extension at the end of the shaft about which the roller rotates, or by connecting linkage, such as the lever 34 and link 36, Figs. 1 and 2. If such linkage is used, its effective angle is so disposed as to produce the proper movement of arms 73, one such device being illustrated in this Fig. 3 and including a lever 74 and link 75, the latter being attached to some convenient guiding means, such as the lever 35 previously described.

When the arms 73 have been swung outwardly so that the tapes assume the position shown by dotted lines or some similar inactive position, delivery of the material is similar to that described with respect to Fig. 1. When moved to the full-line position, Fig. 3, discharged prints or other sheet material are caught between the tapes just after they have passed about roller 72 and the sealing sleeve and will then be carried around and up over rollers 67 and 65 to pass down and be ejected at the back of the machine as described with respect to Fig. 1.

Referring to Fig. 4, the mechanism of Fig. 3 is illustrated as it may be applied to that type of machine which has no intermediate advancing member, such as the mesh or link belt 12 or 54. In this event developed material is moved upwardly along the surface of developing chamber 16 and is then passed over a roller 77 to be discharged at the front delivery position if the mechanism is set as shown in dotted lines. If the tapes 76 are set for rear delivery, then the sheet material moving between roller 77 and the sealing sleeve 78 is caught by the run of the tapes passing about roller 80 and is, from that point, conveyed and discharged as described relatively to the form of the invention of Fig. 3.

Of course, certain parts are driven to assure positive functioning of the sealing sleeve and 75 tapes, and the roller 60 is to be swung from one
position to another all as described with respect to similar parts in Fig. 3.

When using the form of the invention of Figs. 1 and 2, an adjustment may be effected by intermediate settings of lever 34. During front delivery an adjustment of the setting so that the point at which the material is released by the belt 12 and sleeve 13 is varied, improves the angle of delivery and also gives an amount of control for causing the material to issue in ironed or smoothed condition.

The invention has been described by reference to certain types of printing and/or developing machines to which it may be applied. The principles involved are advantageously employed in all similar machines wherein sheet material, either in cut sheets or in substantially continuous lengths are to be delivered selectively to either one or another of two positions. The terms "front delivery" and "rear delivery" have been used since it is most frequently desired to discharge the material at either the front or back of a machine of the type. It is to be understood, however, that these terms are merely relative and that delivery might be switched from one side to the other, or in any two directions which are more or less opposed.

In each of the forms of the invention described the above-mentioned advantage taken of the tendencies of the humidified material is evident. At the front delivery point the pathway of the sealing sleeve is always angularly curved in the direction necessary to force the material to be precluded out and away from its established path of travel. The sharp curve through which the material is bent breaks its tendency to adhere to the carrier.

When set for rear delivery, the curvature of the carrier or sleeve is such as to take advantage of the material's tendency at the time. When it reaches the rear delivery point, it has become relatively dry and is directly discharged as the carrying means recede from it.

In forms of the invention illustrated in Figs. 3 and 4, front delivery is similarly controlled, but for rear delivery, the auxiliary tapes prevent release at the front and extend the travel of the material as intended.

It is to be understood that the preferred embodiment and modifications herein described are more or less positive to a particular embodiment, but that is not to be interpreted in a limited sense. The general aspects of the machine may vary widely and specific details, such as the control elements, driving connections, and others may be similarly varied without departing from the broader inventive concept. While one preferred embodiment and certain modifications of the invention have been disclosed, it is to be understood that the inventive concept may be carried out in a number of ways. This application is, therefore, not to be limited to the precise details described but is intended to cover all variations and modifications thereof falling within the spirit of the invention and the scope of the claims.

I claim:

1. In a device for delivering sheet material, the combination of a first pair of superposed travelling means between which said material is conveyed, guiding means having two operating positions about which one said travelling means passes, control means for changing the operating position of said guiding means from one to the other said positions, auxiliary travelling means operable to contact said material in one of said operating positions thereby causing said material to be delivered in a direction different than the direction taken by said material when said guiding means is in the other of said operating positions.

2. In a device for delivering sheet material, the combination of means including a belt by which said material is conveyed, guiding means for said belt shiftable to at least two positions and control means to change the position of said guiding means, supplementary conveyed means including a series of tapes driven in synchronism with said conveying means, said conveying means being shiftable to different positions in one of which it engages and alters the direction of delivery for said material, and in the other of which it has no contact nor effect thereon.

3. In a device for delivering sheet material, the combination of conveying means including a belt, means for driving said belt and guiding means over which it passes including a freely rotatable roller and a driven roller, means for swinging said driven roller to different positions about the freely rotatable roller as a center, a series of tapes driven in synchronism with said belt and means for altering the position of said tapes so that they wrap about the said belt at a position adjacent the driven roller and a point of discharge for said material so that the course of the material will be altered and its direction of delivery thereby selectively varied.

4. In a device for delivering sheet material, the combination of material conveying means including a belt and guiding and driving means for said belt including a driven and a freely rotatable roller, arms pivoted at said freely rotatable roller and carrying means at their free ends upon which said driven roller rotates, driving means for said driven roller effective at any position of said roller as it is moved to different positions by changing the angular relationship of said arms, supplementary conveying means including a series of tapes, a driving roller for said tapes and guiding means therefor adjacent the driving means for said belt and brackets movable to different positions and supporting said guiding means effective when in one position to wrap said tapes about a portion of said belt thereby to contact and guide the delivered material in one direction, but when in another position, being effective to remove said tapes from a position in which they affect the discharge of sheet material.

5. In a device for delivering sheet material, the combination of conveying means operable to contact said material in one of said operating positions thereby causing said material to be delivered in a direction different than the direction taken by said material when said guiding means is in the other of said operating positions.
by the belt to continue along with said belt until engaged by said first-mentioned tapes, thereby to be conveyed between the belt and these tapes until discharged from the machine.

6. Mechanism as defined in claim 5 further characterized by the fact that said brackets have projecting arms between which is a slot engageable with means adjacent the free ends of said arms.

7. In a device for delivering sheet material, the combination of material conveying means including a belt and guiding and driving means for said belt, said last-mentioned means including a driven roller and a freely rotatable roller, arms pivoted at said freely rotatable roller and carrying means at their free ends upon which said driven roller rotates, driving means for said driven roller including a driven gear centered at the pivot for said arms and interconnecting gears for transmitting power from said gear to the driven roller, supplementary conveying means including a series of tapes, driving means and guiding means for said tapes, and means for controlling said guiding means to cause said tapes to assume different positions, one of said positions being operative to wrap said tapes about said belt as it passes its driving roller thereby to effect delivery of material in one direction, while in its other position the said tapes are withdrawn from wrapping engagement with the said belt thereby to permit discharge of the material prior to a point where the said belt passes about its driving roller.

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