

Feb. 7, 1961

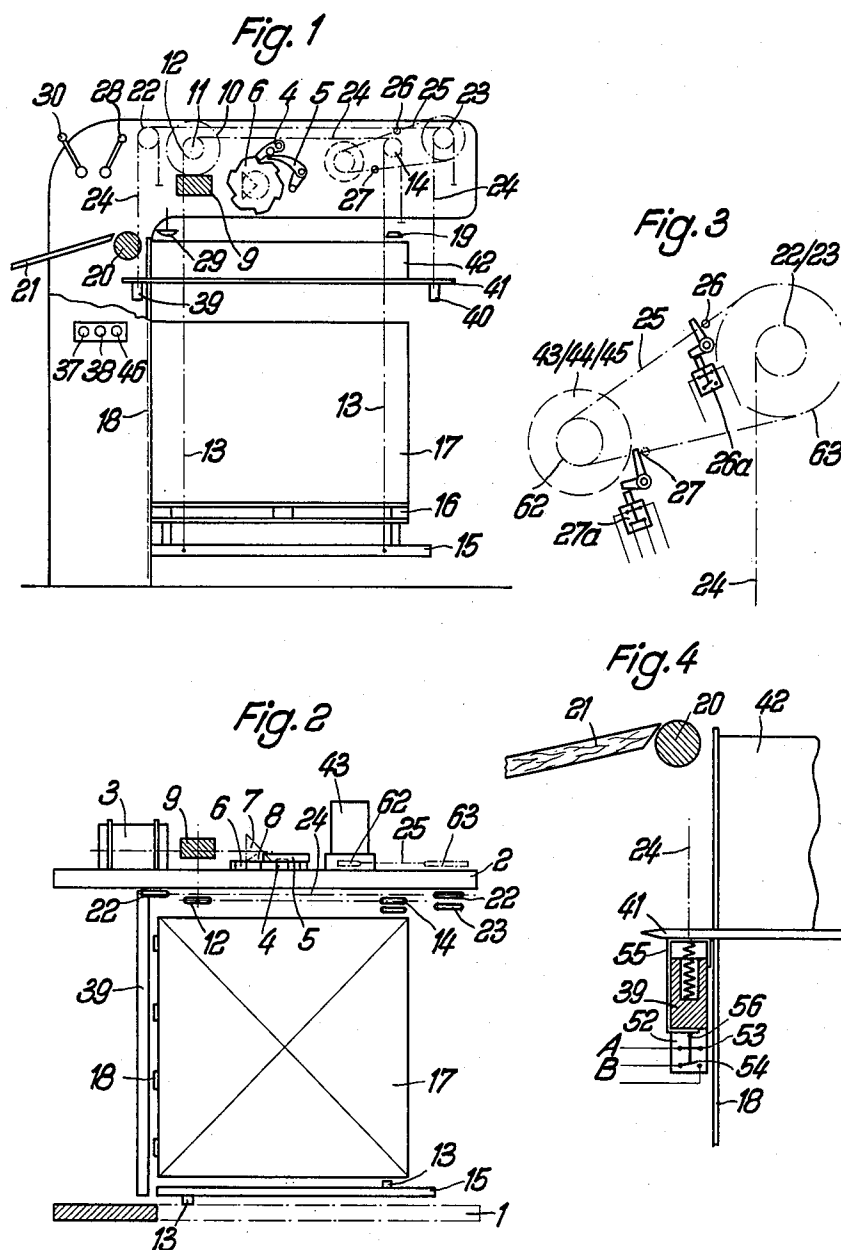
A. SCHWEBEL

2,970,835

PILE LIFTING DEVICE FOR USE IN SHEET PRINTING MACHINES

Filed April 30, 1958

4 Sheets-Sheet 1



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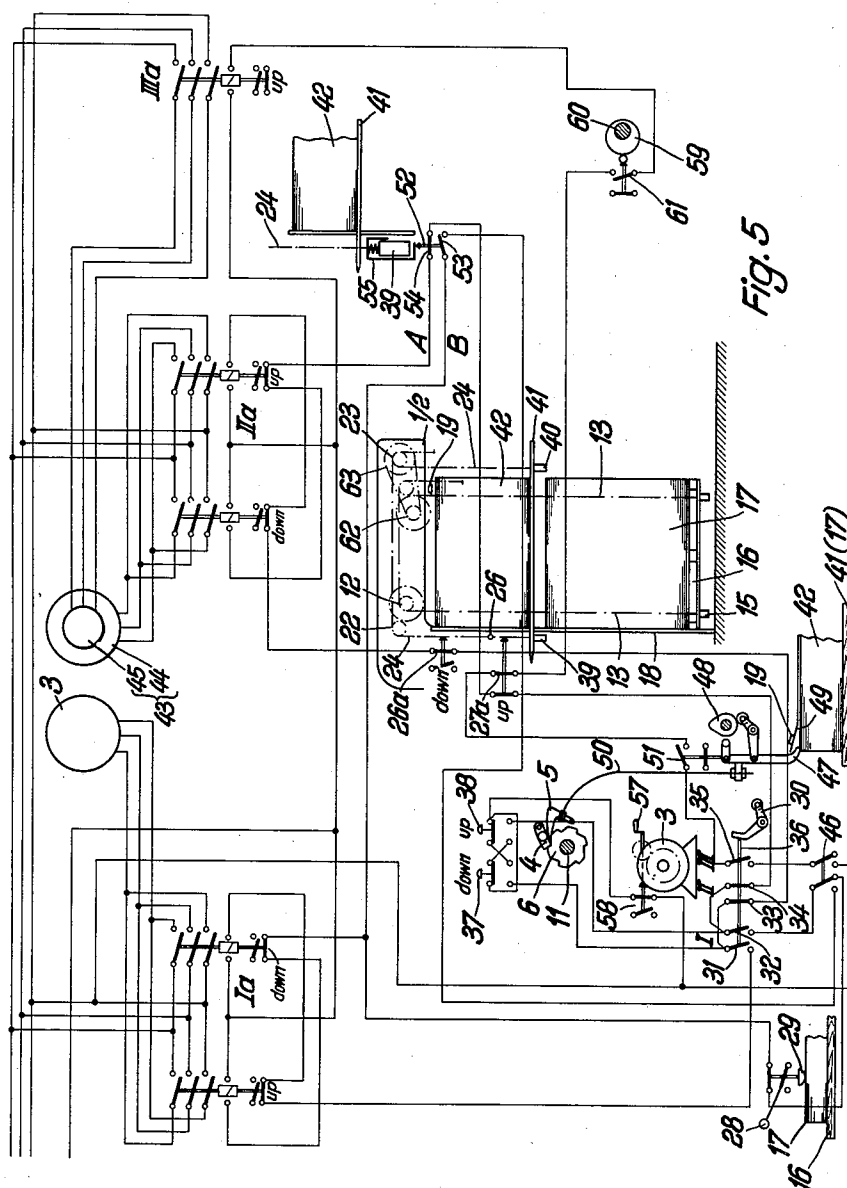
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PILE LIFTING DEVICE FOR USE IN SHEET PRINTING MACHINES

Filed April 30, 1958

4 Sheets-Sheet 2



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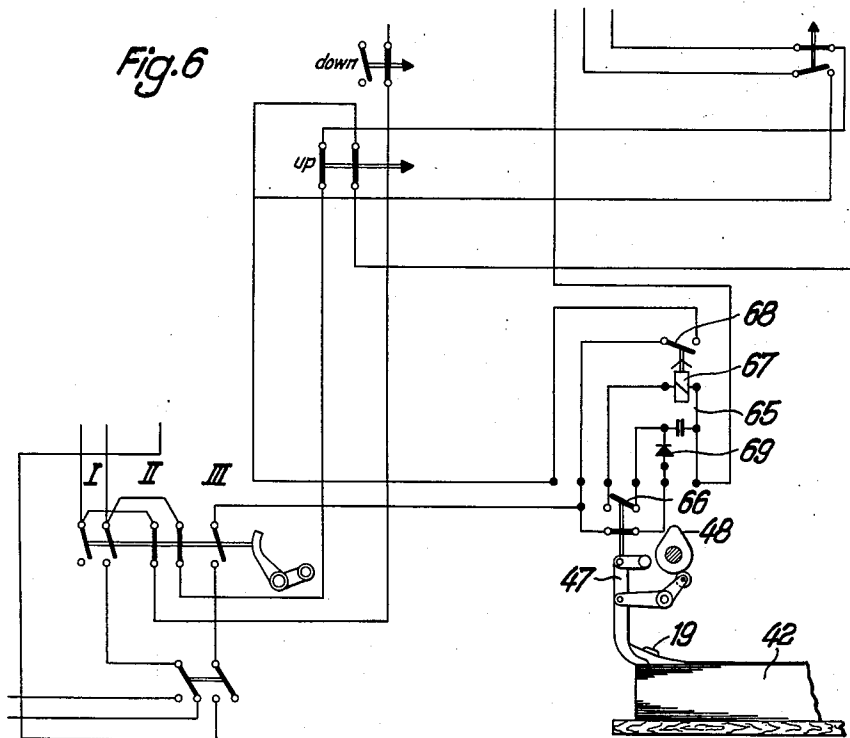
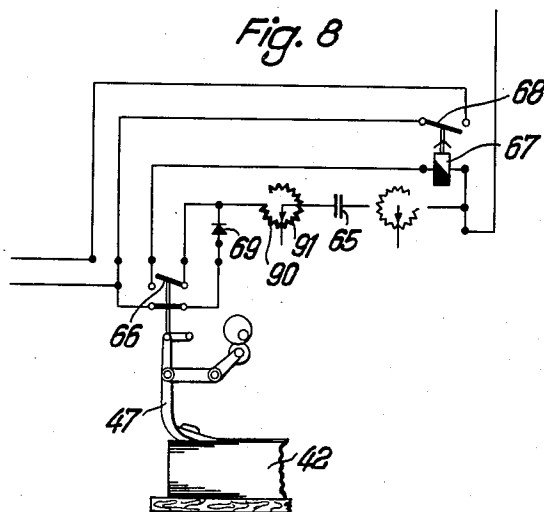
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PILE LIFTING DEVICE FOR USE IN SHEET PRINTING MACHINES

Filed April 30, 1958

4 Sheets-Sheet 3



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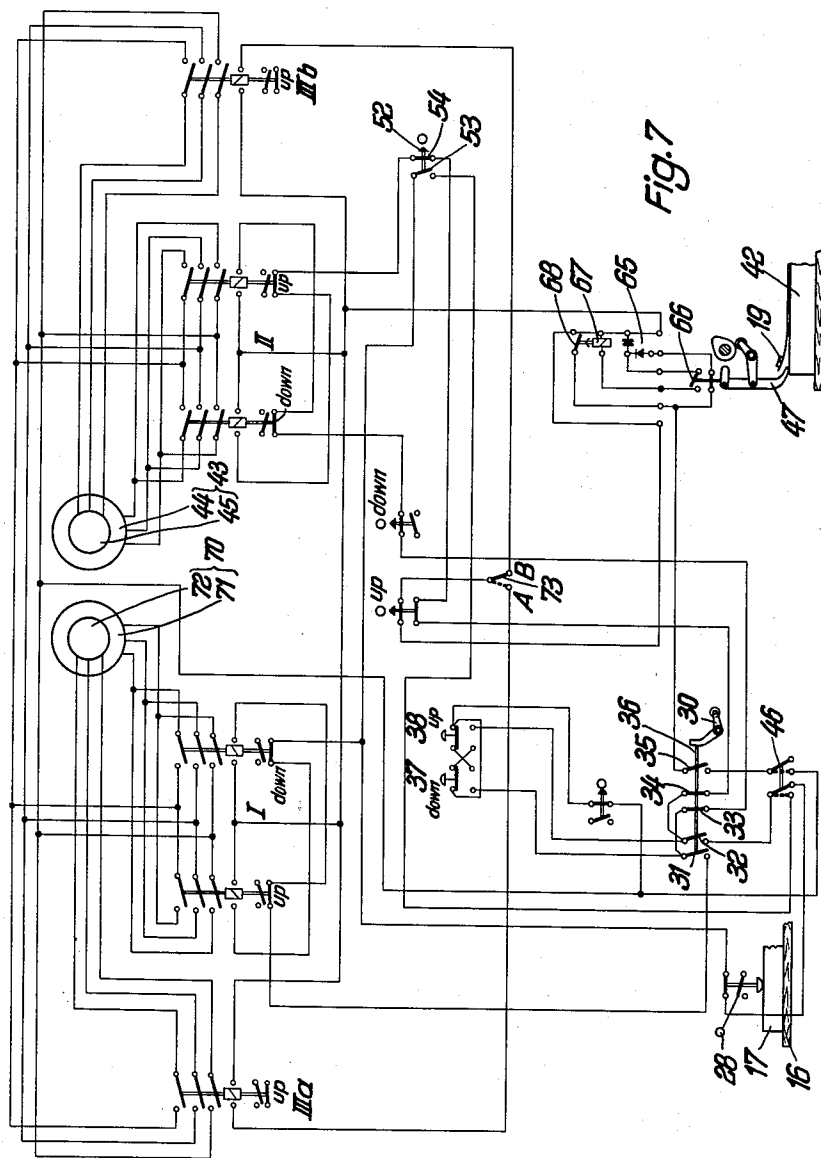
A. SCHWEBEL

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FILE LIFTING DEVICE FOR USE IN SHEET PRINTING MACHINES

Filed April 30, 1958

4 Sheets-Sheet 4



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2,970,835

PILE LIFTING DEVICE FOR USE IN SHEET PRINTING MACHINES

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Filed Apr. 30, 1958, Ser. No. 732,075

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13 Claims. (Cl. 271—62)

This invention relates to machines for printing on sheets and has particular reference to the means therein for the uninterrupted feeding of the sheets into the printing mechanism and to the lifting of the piles of sheets to enable such continuous feeding, and in which the piles are first raised by a main pile lifting device until nearly used up, whereupon the remaining rest pile is taken over at a certain height by an auxiliary lifting device which continues the lifting until a new pile has been introduced. The invention is an improvement of the sheet lifter shown and described in the specification of my Letters Patent of the United States No. 2,900,186, granted to me on an application filed on May 23, 1956.

In devices of this class it is usual to raise the combined main and rest piles of sheets first by a primary set of chains and to then continue the lift on the rest pile by a secondary set of such chains. During the operation of the secondary set of chains the main pile lifting means are given time to be lowered into their lowermost or initial position in order to be loaded with a new pile, whereupon the operation just described is repeated.

The known devices of this type suffer the disadvantage of requiring costly and space consuming driving gears and controls which consist of a great number of parts and are cumbersome and difficult to produce and operate. They are also unreliable, being prone to faults in fitting and handling and, besides, are subject to excessive wear. Other disadvantages are the comparatively powerful lifting and driving motors which are required, and their compendious array of additional or auxiliary parts which render them practically inaccessible.

It is, therefore, the main object of the invention to provide in a sheet feeder of the said kind a pile lifting device in which these and other disadvantages are absent, and which shall also be void of unnecessary complications but be reliable in its function and easy to control and operate.

Another object of the invention rests in a generally simplified construction of the sheet lifting device enabling a reduction of parts and, therewith, of the costs of production and other associated advantages.

A further object of the invention is the provision of improved electrical means and connections to simplify the control and manipulation of the main pile and rest pile lifting devices.

Other objects are the provision of adequate safety means to prevent faults in the transfer of the sheets from the piles to the sheet feeding means and to safeguard the device against damage by inadvertance or other reasons, and to ensure the attainment of the exact end positions of both the main and the auxiliary lifting devices in operation.

Still another object is the provision of means to safeguard the piles exceeding their sheet feeding position, or to remain below the same respectively, and to improve the pile lifting means and the means for controlling the same so as to enable the maintenance, at all

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feeding speeds, of the correct distance between the top sheet of the main pile, or of the rest pile respectively, and the sheet separating and feeding means.

These and other objects and improvements are obtained in accordance with the invention by a sheet lifting device in which the pile of sheets is first raised by the main lifting device, in timed relation with the feeding of the sheets into the printing mechanism until nearly used up, after which the remaining rest pile is taken over by an auxiliary lifting device having its own lifting means including a secondary set of chains and an auxiliary lifting table in order to be lifted also in timed relation with the feeding of the sheets into the printing mechanism. The auxiliary drive, controlled for example by the high speed winding of an auxiliary lifting motor and comprising the aforesaid auxiliary lifting table with its pertaining lifting devices, raises the rest pile step by step in accordance with the feeding of the sheets by means of a fine wire winding, whereupon the auxiliary lifting device is returned into its starting position by the same auxiliary motor with its high speed winding.

If in a device of the said type a control disc is employed which, in cooperation with a presser foot, or feeler, releases for each sheet a control stroke of a certain magnitude, and if the printing machine is caused to run at an increased speed with certain kinds of paper, then the disadvantage prevails, that the said control disc can not keep the current to the driving means of the lifting device closed for a sufficiently long time, while it may remain closed for too long a time if the machine is allowed to run at reduced speed. In these cases the pile will be lifted either too little or too much with the effect, that it either does not reach the sheet feeding level or that it exceeds it. Both exigencies are most undesirable.

This is prevented, in accordance with the invention, in that the current which may have accumulated in a condenser, is discharged into the driving means of the auxiliary lifting device, or its ring winding respectively, constantly and without regard to the sheet feeding speed, as soon as the said feeler comes in contact with the decreasing height of the pile. At this moment the switch, which is in connection with it, closes the current to the relay and to the switch, so that a contactor designated "up" gets into action and raises the pile by another step in conformity with the feeding of the sheets into the printing mechanism.

In a modified form of the invention the switch gears of the embodiment just referred to are replaced by a considerably simpler arrangement, namely by the use of a lifting device in a plurality of electric circuits, in which a transposition of parallel wires, or an electric switch arm, is provided. In this arrangement one circuit raises the main lifting device with its pile of sheets intermittently in accordance with the feed of the sheets into the printing mechanism, while a second circuit causes the auxiliary lifting device to raise the rest pile also in conformity with the feeding of the sheets, and to return both lifting devices into their starting positions.

The pile lifting devices in accordance with the invention can be further improved in that the lifting means which continue the intermittent lifting of the rest pile can be moved at any desired height of the steps. This is made possible by connecting a time relay, or a time-adjustable potentiometer, into the circuit, either before or after the condenser, so that by means of the timer the working circuits for the drive of the lifting motors can be supplied to the condenser, or the relay, in conformity with any desired height of the steps of the pile lifting device.

The accompanying drawings diagrammatically illus-

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trate the invention by way of example, several modifications of the device being shown. In these drawings:

Fig. 1 shows an embodiment of the pile lifting device in side elevation.

Fig. 2 is a plan view thereof.

Fig. 3 illustrates the auxiliary driving means.

Fig. 4 is a detail showing an electric control and safety device in connection with the auxiliary pile table.

Fig. 5 shows a wiring diagram of the pile lifting devices.

Fig. 6 illustrates the arrangement of a condenser in a wiring diagram as shown in Fig. 5.

Fig. 7 illustrates the wiring diagram of a more simplified modification of the pile lifting device.

Fig. 8 illustrates the arrangement, in the wiring diagram of Fig. 6, of a potentiometer and time switch.

Fitted to the walls 1 (broken off in Fig. 1) and 2 of the frame of a sheet feeder for printing machines is the main pile lifting motor 3 with its intermittently operating switch gear, which is denoted by its main components namely, the pawl 4, the pawl lifter 5, the ratchet wheel 6, gear wheels 7 and 8, worm 9, and the worm wheel 10. Keyed to the shaft 11 of the worm wheel are sprockets 12, over which and the sprockets 14, the main lifting chains 13 are passed. Supported on the carrier board 15 is the main pile table 16, which may be a grate or the like, and which carries the main pile of sheets 12 so that it rests firmly against the front stops 18. The sheet separating and feeding nozzles 19 of known or convenient kind depend from the overhanging top of the frame to slightly above the top of the pile 17, while the sheet feeding roller 20 and the feeding board 21 are arranged in front of the pile.

Denoted by the numerals 22 and 23 are the sprockets for the auxiliary lifting chains 24. They may be driven, for example, by a combined high speed and fine wire motor 43, hereinafter called auxiliary motor, having a high speed winding 44 and a fine wire winding 45 (Fig. 5). The endless driving chain 25 which runs over the motor driven sprocket 62 (Fig. 3) and the sprocket 63 is provided with abutments 26 and 27 adapted to operate the switches 26a and 27a and to thereby disconnect the motor. The length of the chain 25 is such as will permit the auxiliary lifting chain 24 approximately to pass through the lifting height of the rest pile; the switches 26a and 27a thus representing limit switches. A switch 28 (Figs. 1 and 5) is also provided to raise and lower a ram 29 by means of which the upper position of the pile can be determined. These parts constitute the main pile end switch, which means, that when the pile 17 has reached a predetermined position in which it contacts with the ram 29, it moves the same upwards by a certain amount and actuates the lever 28 which disconnects the main table 16 and sets it at rest. This arrangement corresponds to the one shown in Fig. 12 of my aforementioned U.S. patent specification No. 2,900,186.

A lever 30 serves for the actuation of a switch 36 (Fig. 5) which comprises the switch block I with its contact bridges 31, 32, the switch block II with its contact bridges 33, 34, and the switch block III with its bridge 35.

A push button 38 is provided to start the lifting motor 3 and to lift the pile 17 by its supports 15, 16, while a push button 37 serves to lower the empty pile table into its starting position. These push buttons 37 and 38 also serve to actuate the auxiliary lifting motor 43 for raising and lowering the auxiliary carrier bars 39, 40 including the auxiliary table, grate, or the like 41 which serves to support the rest pile 42 and which has been slid in between the upper sheets shortly before the main pile 17 became used up. Another switch 46 serves for putting the continuous, uninterrupted lift of the pile into operation.

For maintaining the correct distance from the top surface of the pile to the feeding nozzle 19, a presser foot or feeler 47 (Fig. 5) is provided, which may be of generally known type so that its precise configuration and function need not particularly be described. A cam 48

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is provided to move the feeler 47 over the pile and under the edge of the top sheet 49 after the same has been attracted and slightly lifted by the feeding nozzle 19. A Bowden cable 50 connects the feeler 47 to the lifter 5 of the pawl 4 and, over the said feeler, with the switch 51.

Associated with a one-way shaft 60 is a control cam 59 as shown on the right hand side of Fig. 5, which opens and closes a contact 61 of the auxiliary lifting device in timed relation to the feeding of the sheets into the printing mechanism of the printing machine. This arrangement ensures the correct start of the lifting means for the rest pile 42, when simultaneously with the switch 60 also the switch 51 is closed by the intermittent action of the feeler 47.

The carrier 39 of the auxiliary lifting device (Figs. 1 and 5) is provided with an electric switch gear 52 comprising the contact bridges 53 and 54. A connecting rail 55 extends over the whole width of the carrier bar which, with its articulated lower part, is connected to the knob 56 of the switch gear 52 and also serves to limit the downward movement of the bar within the said connecting rail.

A hand crank 57 (Fig. 5) is provided which, when applied to the main pile lifting motor 3, permits of adjusting the position of the pile as by raising or lowering the same by hand as may be required. By the application of the crank handle to its shaft a contact 58 is actuated, which disconnects the motor from the line and thus enables a safe actuation of the crank.

The mode of operation of the device just described is substantially similar to the sheet feeder described in my former United States Patent No. 2,900,186. After a pile of sheets 17 has been wheeled into the lifting device on a trolley or the like, the support 15 for the pile table 16 is suspended in the chain 13 of the lifting gear which is actuated by the motor 3. As a safety means against damage to the nozzle 19, which is located directly above the pile 17, or the rest pile 42 respectively, the lever 28 for the limitation of the pile end position is turned into its operative position as shown in Fig. 5, in which the ram 29 is approximately flush with the feeding means 20, 21 (Fig. 1). By pressing the push button 38 the lifting motor 3 is started so as to rotate the worm and worm wheel 9, 10 and to thereby move up the chain 13 together with the pile table 15, 16 and the pile 17 resting thereon. By turning the lever 30 the contact slide 36 (Fig. 5) of the combined switch blocks I, II and III becomes connected so that a circuit is closed at 31, 32 (block I) and at 35 (block III) while block II is cut out by the opening of the contact bridges 33, 34.

Connected into the circuit which is closed over the contact bridges 31, 32 (block I) are the contactors Ia ("up" and "down"), while the lead to the "up" contactor IIIa is in a ready-for-work position by the contact bridge 35 (block III) for an intermittent and fine control of the rest pile 42 as by means of the motor 43 and its fine wire winding 45, when the continuous switch 46 is turned on. The contact bridges 33 and 34 of the switch block II, when open, interrupt the supply of current to the contactor IIa ("down" and "up") which, when closed, would raise and lower the auxiliary lifting means 39, 40 by winding up their chains through the motor 43 over its high speed winding 44 without any intermittent control.

Simultaneously with the actuation of lever 30 as described above, pawl 4 has been lifted off the ratchet wheel 6 by means of the lifter 5.

Both switches 38 (up) and 37 (down) are now ready for the start of the pile lifting motor 3 without risk to any other devices or arrangements. When the button of the switch 38 is pushed in, motor 3 lifts pile 17 via the contactor Ia (up) by means of the lifting chains 13 until its top sheet strikes the pile end limit switch, namely the ram 29, whereby the supply of current is interrupted.

Now the lever 36 is turned back so that pawl 4 drops into the teeth of the ratchet wheel 6 and the contact

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bridges 31 and 32 are opened, whereby the switches 38 and 37 ("up" and "down") are safeguarded against unauthorized actuation, break or damage, by having become without current. The feeler 47, which controls the position of the pile surface at every feed of a sheet into the printing mechanism by the nozzle 19, is now moved inwardly over the pile and lowered into contact therewith. The feeler 47 continues to descend as the distance between the nozzle 19 and the top sheet of the pile becomes greater, so that the Bowden cable 50, which is connected to the feeler 47, becomes actuated to cause the release of pawl 4 by the lifter 5 to which the free end of the Bowden cable is attached. This, by any known or convenient means (not shown), causes an intermittent rotation of the ratchet wheel 6, whereby the chains 13 are moved over their sprockets 12, 14 and the pile 17 is raised in timed relation to the withdrawal of the sheets as they are fed into the printing mechanism of the machine.

After the pile 17 has been raised to approximately the level of the feeding means and eventually worked off to a rest pile 42, an auxiliary pile table 41, which may be a grate or the like, is pushed in between the pile table 16 and the rest of the pile 17 to right over the foremost carrier bar 39 so as to rest on the two carriers 39 and 40. During these manipulations, which are known per se, the sheet lifting gear 4 to 12 has suffered no interruption in its progressive pile lifting operation.

Now the continuous switch 46 is turned on and the push button 38 ("up") is depressed. This closes the circuit to the motor 43 over the bridge 33, 34 (II) and the contactor IIa ("up") with its high speed winding 44, so that the carrier bars 39, 40 are raised by their chain 24 until arrested below the auxiliary pile table 41, when the limit switch 52 (Figs. 4 and 5) is opened through contact of the auxiliary table 41 with the carrier 39, and the circuit A of the contactor IIa ("up") closed at the bridge 54. Lever 30 must now be thrown in, which causes the switch blocks I and III to close and the block II to open so that pawl 4 becomes disconnected and put out of operation. By now pressing push button 37 ("down") the main pile lifting motor 3 is reversed and the now empty pile table 16 lowered into its initial position ready to receive another pile or to be wheeled out of the sheet feeding device.

The decreasing rest pile 42 is now intermittently lifted through means such as the sprockets 62, 63 and the chains 24 driven by the fine wire winding 45 of motor 43 in conformity with the feeding of the sheets into the printing mechanism of the machine by the nozzle 19 as the feeler 47 is caused to fall on the remaining pile by the action of cam 48, whereby the switch 51, which is operated by the movement of the feeler, closes the circuit through the fine wire winding of the motor. When the top surface of the pile has eventually reobtained its correct position in relation to the separating nozzle 19, the feeler 47 settles on the pile in so high a position as to be unable to close the switch 51, so that the fine wire winding of the motor and the contactor IIIa receive no current and, therefore, can not come into action.

Meanwhile a new pile has been wheeled into the main lifting device of the sheet feeder and supported on the chains 13. Actuation now of the push button 38 (up) causes the pile to be raised by the pile lifting motor 3, until the top of the pile strikes against the lower side of the auxiliary table 41 and the end limit switch 52 as already described, and interrupts the current in the lines A, B at the bridge 53 of the limit switch 52 (Figs. 4 and 5).

Lever 30 is now returned and the contacts 31, 32 opened, whereby pawl 4 becomes thrown into engagement with the teeth of the ratchet wheel 6. The auxiliary table has meanwhile been pulled out from the united piles 17 and 42, the lifting of which is now performed, as in the beginning of the operation, by the separating means above the pile top surface and the lifting gear 4 to 12

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under the control of the feeler 47 taking its position on the top of the pile.

The contacts 33 and 34 remain closed, so that the carrier bars 39, 40 of the rest pile 42 can be lowered again by depressing the button 37 (down) through the high speed winding 44 of motor 43 for the reception of a new pile.

Both end positions of the auxiliary lifting device are ensured by the abutment 26 on the chain 25 actuating the corresponding switches 26a and 27a (Fig. 3). This arrangement, however, can instead be provided on the elevator chain directly as shown in Fig. 5.

It is possible within the meaning of this invention to employ synchronized or polarized motors as auxiliary driving means for lifting and lowering, and for the intermittent lifting of the auxiliary lifting means if this should be desired.

The wiring diagram which is shown in Fig. 6 corresponds substantially with the one shown in Fig. 5 but having a condenser 65, the rectifier 69 pertaining thereto, a relay 67, 68, and the switch 66 which is mounted on the feeler 47.

During the operation of the device the condenser 65 takes up current in accordance with its capacity. When the feeler 47 is lowered onto the pile after the same has diminished by the number of sheets already fed into the printing device, the said feeler takes with it the switch 66 which closes the circuit to the relay 67. Bridge 68 becomes attracted, and the current accumulated in the condenser sets the driving motor 43 (Fig. 5) with its fine wire winding 45 and the contactor IIIa (up) in motion. The rest pile 42 with its carrier bars 39, 40 is raised in accordance with the current which has been accumulated in the condenser, and is brought with its upper surface into its former position in relation to the separating nozzle 19. The arrangement just referred to causes the obtained level to remain constant without regard to the actual speed of the sheet feeding.

In the modified form of the invention as illustrated in Fig. 7, the lifting drive means are arranged in a plurality of circuits in which a transposition of parallel wires (switch) is arranged, one of which serves to raise the main lifting device together with its pile of sheets, and subsequently continues to lift it in conformity with the feeding of the sheets into the printing mechanism of the machine. A second drive means, including its auxiliary lifting devices, takes up the auxiliary pile table and continues to intermittently lift the rest pile, while both lifting drive means return the main and the auxiliary lifting devices into their initial position. This takes place in the following manner:

Switch 36 is actuated by lever 30 whereby the bridges 31, 32 and 35 are closed and the bridges 33 and 34 opened. The contact arm 73 is moved into position A. If now the pile end switch or ram 29 is moved into a position of readiness over the rest pile top by means of lever 28 as already described with reference to the main pile, the circuit to the contactor I (up) is closed when the push button 38 becomes depressed and the high speed winding 71 of motor 70 receives current. The main lifting means 13, 15 (Fig. 1) begin to lift the pile 17 until its top sheet comes into the vicinity of the separating nozzle 19. Simultaneously with this operation the pile end switch or ram 29 has become lifted off the top surface of the pile and the circuit is again interrupted.

Now the continuation switch 46 is turned as indicated by the broken lines, and the current flows over the closed bridge 35 into the condenser 65 from which—in accordance with its capacity, when the feeler 47 settles on a reduced pile and thereby closes the circuit to the relay 67 and the bridge 68 with its switch—it flows into the auxiliary motor 70, or its fine wire winding 72 and the contactor IIIa respectively, whereby the pile becomes lifted in conformity with the feed of the sheets into the printing mechanism.

Meanwhile the pile 17, owing to the continuous with-

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drawal of sheets or the continuous lift respectively, has attained a height approximately in level with the feeding means 20, 21 so that the auxiliary table 41 can be pushed in between the pile table and the pile.

Lever 30 is turned into the position shown in Fig. 7 so as to close the bridge 33 and 34. Current now flows to the auxiliary driving motor 43 which, with its high speed winding 44 and the auxiliary carrying bars 39, 40, takes up the pile on the auxiliary table 41. It comes to a standstill immediately when the switch 52 interrupts the circuit at the bar 39 (Fig. 4).

Then lever 30 is turned again so that the bridge 35 for the intermittent lifting of the rest pile 42 becomes closed after the electric switch arm 73 has been changed over to B.

The fine wire winding 45 of the auxiliary lifting motor 43 receives the current rationed to it and collected by the condenser 65 in accordance with its capacity—when the feeler 47 is lowered onto a fairly used-up pile—and takes with it the switch 66 which is connected to it and eventually closes the circuit to the relay 67—which keeps the auxiliary drive and its contactor IIIb in motion only as long as the original working position of the pile surface in relation to the separating means 19 has been reattained.

Meanwhile, by the actuating of the push button 37 via the high speed winding 71 of the lifting motor 70, the main lifting device 15 has been lowered via the contactor I (A, B) into its initial position.

As illustrated in Fig. 8, a potentiometer 90 of any known or convenient kind may be connected into the circuit either before or after the condenser. It is provided with a time switch 91, which is so connected to the potentiometer, that the pile, which diminishes by the constant withdrawal of sheets, is so lifted in comparatively large or small amounts—corresponding to the thickness of the sheets—that the top surface of the pile remains in the activity region of the separating and feeding means such as 19, 20 and 21.

By this arrangement the condenser, or the relay respectively, 67 receives the required capacity of working current which, when the feeler 47 is not able to contact with the top surface of the pile, would supply the lifting motor with current for the lifting of the pile up to the desired height.

The arrangement just described can also be employed in such sheet feeding devices in which the feeding of the sheets into the printing mechanism has to be interrupted every time a new pile is being introduced.

What I claim is:

1. In a sheet feeder for printing and the like machines having main pile lifting means including a first set of chains, a main pile table and, independent therefrom, auxiliary pile lifting means including a second set of chains and an auxiliary pile table, for the continued lifting of a rest pile from a lowermost position to a top position when the main pile lifting means are being lowered for the reception of a new pile of sheets, and a feeler having electric contacts to regulate the position of height of the pile as the same is lifted by the said main pile lifting means, a main driving motor for driving said main pile lifting means, electric contacts for starting and stopping said motor, an auxiliary driving motor, a fine wire winding and a high speed winding in said auxiliary driving motor for driving said auxiliary pile lifting means by said fine wire winding so as to lift said auxiliary table together with the said rest pile thereon, means for intermittently advancing said pile lifting means in timed relation to the feeding of the sheets into the printing machine, and contacts operable in the top position of said auxiliary pile table for effecting the return of the said auxiliary pile table into its lowermost position by the high speed winding of said auxiliary motor.

2. In a sheet feeder for printing and the like machines having main pile lifting means including a first set of

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chains, a main pile table, means to support said main pile table in said first set of chains, and auxiliary pile lifting means including a second set of chains and an auxiliary pile table for the continued lifting of a rest pile from a lowermost position to an uppermost position when the main pile lifting means are being lowered for the reception of a new pile of sheets, and a feeler having electric contacts to regulate the position of height of the pile as it is lifted by the said pile lifting means, a main driving motor for driving said main pile lifting means, electric contacts operable to start and stop the said motor, an electric circuit in connection with the said motor to be controlled by the said contacts, a continuous switch in said circuit, an auxiliary driving motor, a fine wire winding and a high speed winding in said auxiliary motor for lifting said auxiliary pile lifting means by said fine wire winding, means for interrupting the circuit to the said high speed winding, a manually operable switch for closing the contacts of the said feeler and to the main lifting motor, a switch also in connection with the said feeler for intermittently driving said main lifting motor, mechanical means in cooperation with the said switch for interrupting the supply of current to the fine wire winding of said auxiliary motor in timed relation to the working cycle of said auxiliary lifting device so that the rest pile becomes lifted step by step in conformity with the feeding of the sheets into the printing machine when the said continuous switch is closed.

3. A sheet feeder for printing and the like machines as set forth in claim 2, in which is provided means for operating said continuous switch and for interrupting the auxiliary motor circuit, and means thereby to set the auxiliary lifting device at rest and to permit the main pile of sheets to be lifted by the main pile lifting means only.

4. A sheet feeder for printing and the like machines as set forth in claim 1 having carrier bars for the support of the auxiliary lifting table, a set of chains for holding said carrier bars, a safety rail on at least one of said carrier bars, an electric switch gear in connection with said carrier bars, contacts in the said switch gear for initiating the raising and lowering of the auxiliary pile lifting means, an electric connection between the said safety rail and the said switch gear, and means for voluntarily interrupting the uplift of the main pile and of the rest pile.

5. In a sheet feeder for printing and the like machines as set forth in claim 1, an auxiliary pile lifting device, a set of lifting chains on said auxiliary pile lifting device, carrier bars suspended from said lifting chains for the support of the auxiliary lifting table, an electric switch gear on at least one of the said carrier bars, electric contacts on the said switch gear for initiating the raising and lowering of said auxiliary pile lifting means, a safety rail on at least one of the said carrier bars, an electric connection between the said safety rail and said switch gear, and manually operable means for interrupting the said connection at volunity.

6. In a sheet feeder for printing and the like machines having main pile lifting means including a first set of lifting chains, a main pile table and, independent therefrom, auxiliary pile lifting means including a second lifting chain, and an auxiliary pile lifting table for the continued lifting of a rest pile when the main pile lifting means are being lowered for the reception of a new pile, and a feeler having electric contacts to regulate the position of height of the pile as it is lifted by the said main pile lifting means, carrier bars on the second set of lifting chains, a safety rail on at least one of the said carrier bars, spring means between said safety rail and said carrier bar, an electric switch gear on said safety rail, a contact bridge for initiating the uplift of the main pile, and means by which, on a new pile being lifted into engagement with a member of the auxiliary pile lifting means the latter becomes lifted, while the said switch

on said safety rail and the circuit of the contact bridge for the uplift of the main pile are interrupted.

7. In a sheet feeder for printing and the like machines as set forth in claim 6, the provision of electrically controlled means for correcting the position of height of the auxiliary lifting means.

8. In a sheet feeder for printing and the like machines as set forth in claim 6, means for limiting the high and low positions of the auxiliary pile lifting means, comprising, in combination with the auxiliary driving motor, a driving chain intermediate the said auxiliary driving motor and said auxiliary pile lifting device, contact bridges on the said safety rail, a contact member on said driving chain, and switches for cooperation with said contact member for opening the contact bridges on the said safety rail in order to interrupt the circuit to the said safety rail, or the lift of the auxiliary driving means respectively.

9. In a sheet feeder for printing and the like machines as set forth in claim 6, means for limiting the high and low positions of the auxiliary pile lifting means, comprising, in combination with the auxiliary driving motor, a contact member directly on one of the auxiliary lifting chains, and end switches for cooperation with said contact member for interrupting the circuit between the said safety rail and the pile lifting device.

10. In a pile lifting device for pneumatic sheet feeders for use in printing machines, means for feeding sheets from a pile into said printing machine, main lifting means including a driving motor, a pawl and ratchet device for intermittently lifting said pile into contact with said feeding means, a contactor, auxiliary lifting means for lifting a rest pile of sheets including an auxiliary driving motor for also intermittently lifting said rest pile, and an electric feeler for continuously testing the height of the pile, a fine wire winding in said auxiliary driving motor, a condenser in said fine wire winding to supply current in accordance with its capacity to the auxiliary lifting motor on the said feeler being lowered onto the rest pile of the sheets when the main pile has been reduced to a comparatively low height and for maintaining the electrical working energy constant and in proper sequence of operation for the lifting of the rest pile when the said feeler contacts with the said pile, a relay in the

feeler circuit, and a switch in connection with the said feeler for disconnecting the supply of current to said relay and the switch in the feeler circuit, so that the said contactor becomes actuated.

11. In a pile lifting device for use in printing and the like machines as set forth in claim 10 having a main and an auxiliary pile lifting motor, means for separating the top sheets from the pile at always approximately the same level, the main lifting motor also comprising a high speed winding for lowering the main pile table and for lifting a pile of sheets up to the separating level, a fine wire winding for the continuous lifting of the combined main and auxiliary piles, said main and auxiliary motors being arranged in separate circuits, a contact lever for connecting either the main or the auxiliary motor into the circuit and to lift a rest pile only over the auxiliary lifting means under control of the fine wire winding when the said contact lever is connected up to the circuit of the auxiliary lifting motor.

12. In a pile lifting device for use in printing machines as set forth in claim 10, a potentiometer for causing the lift of the pile step by step in conformity with the feeding of sheets into the printing machine, and a time switch connected into the circuit in front of the said condenser by which the operating circuits for any desired height of pile lifting steps can be transmitted for the drive of the lifting motor to the said condenser.

13. In a sheet pile lifting device for use in printing machines as set forth in claim 10, a potentiometer for causing the lift of a pile of sheets step by step in conformity with the feeding of the sheets into the printing machine, and a time switch connected into the circuit after the said condenser, by which the operating circuits for any desired height of pile lifting steps can be transmitted for the drive of the lifting motor to the relay in the potentiometer circuit.

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