Nov. 11, 1969 R. H. STOTZER ETAL 3,477,712

SHEET HANDLING MACHINE WITH CONTINUOUS DELIVERY

Filed Aug. 28, 1967 5 Sheets-Sheet 1

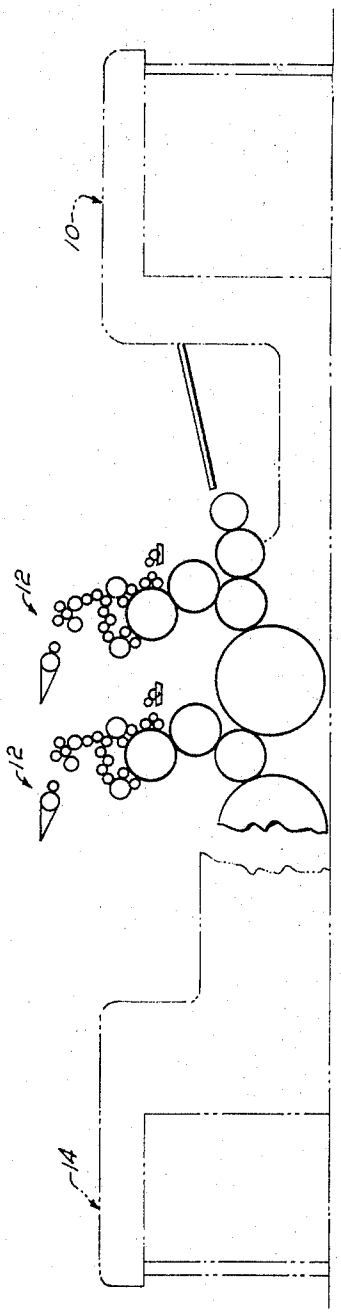


FIG. 1

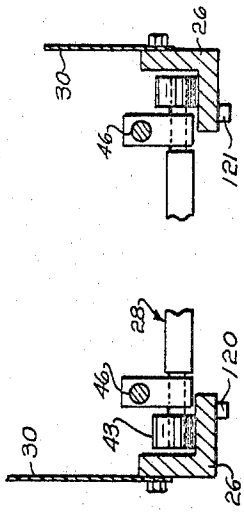


FIG. 4

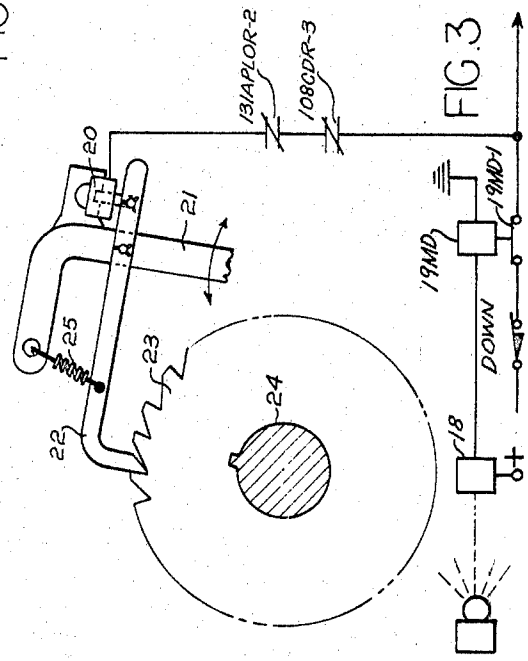


FIG. 3

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SHEET HANDLING MACHINE WITH CONTINUOUS DELIVERY

Filed Aug. 28, 1967 5 Sheets-Sheet 2

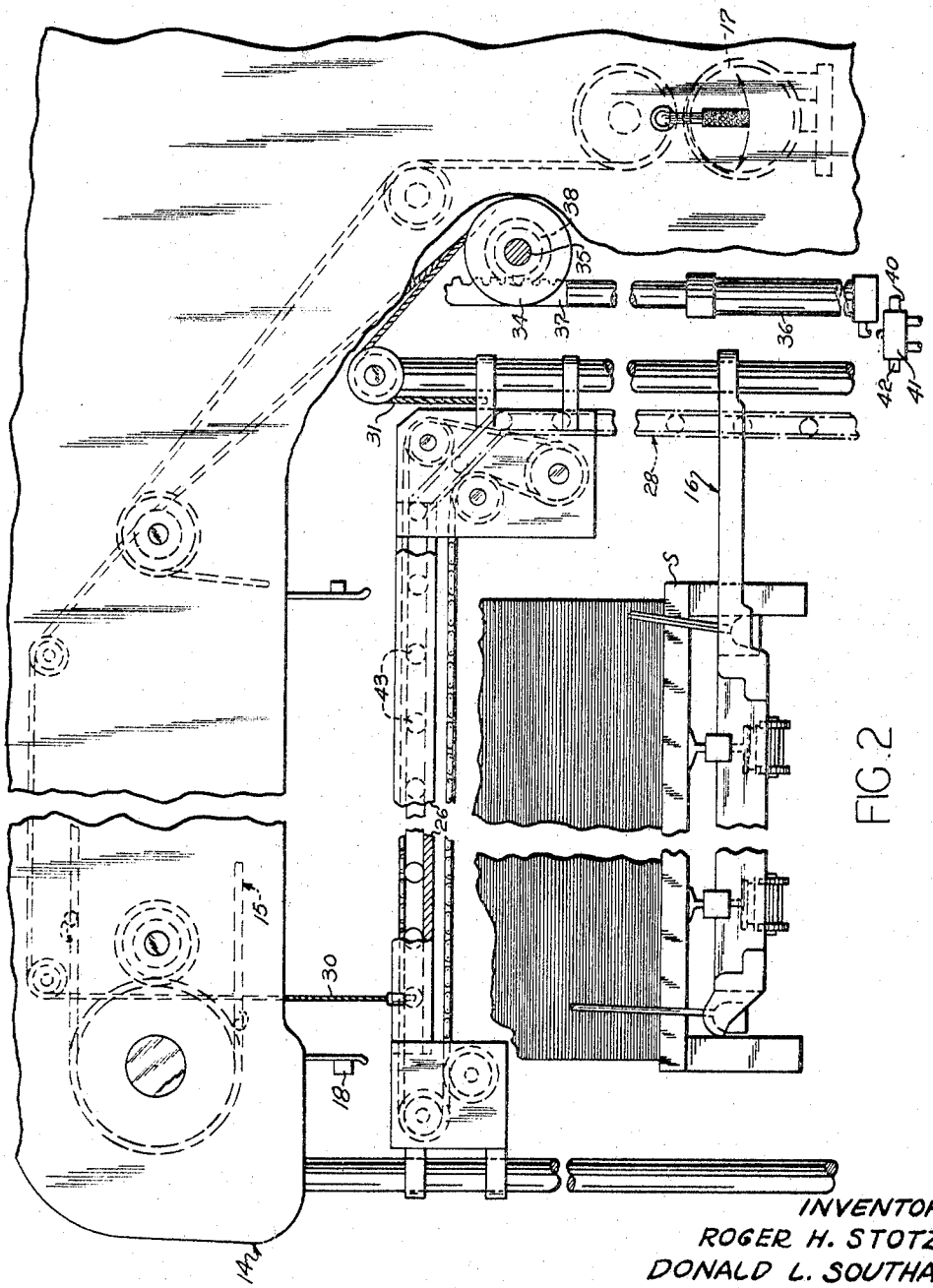


FIG. 2

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SHEET HANDLING MACHINE WITH CONTINUOUS DELIVERY

Filed Aug. 28, 1967 5 Sheets-Sheet 3

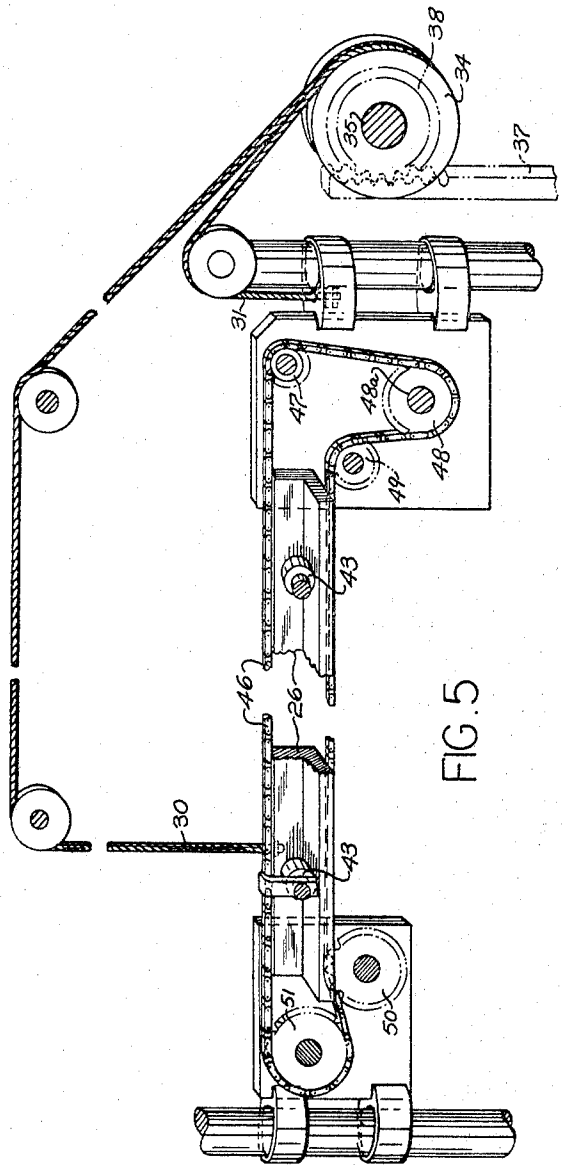


FIG. 5

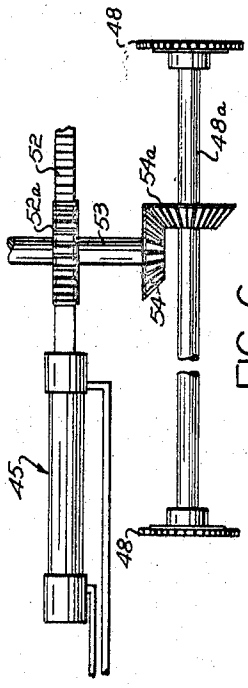


FIG. 6

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SHEET HANDLING MACHINE WITH CONTINUOUS DELIVERY

Filed Aug. 28, 1967 5 Sheets-Sheet 4

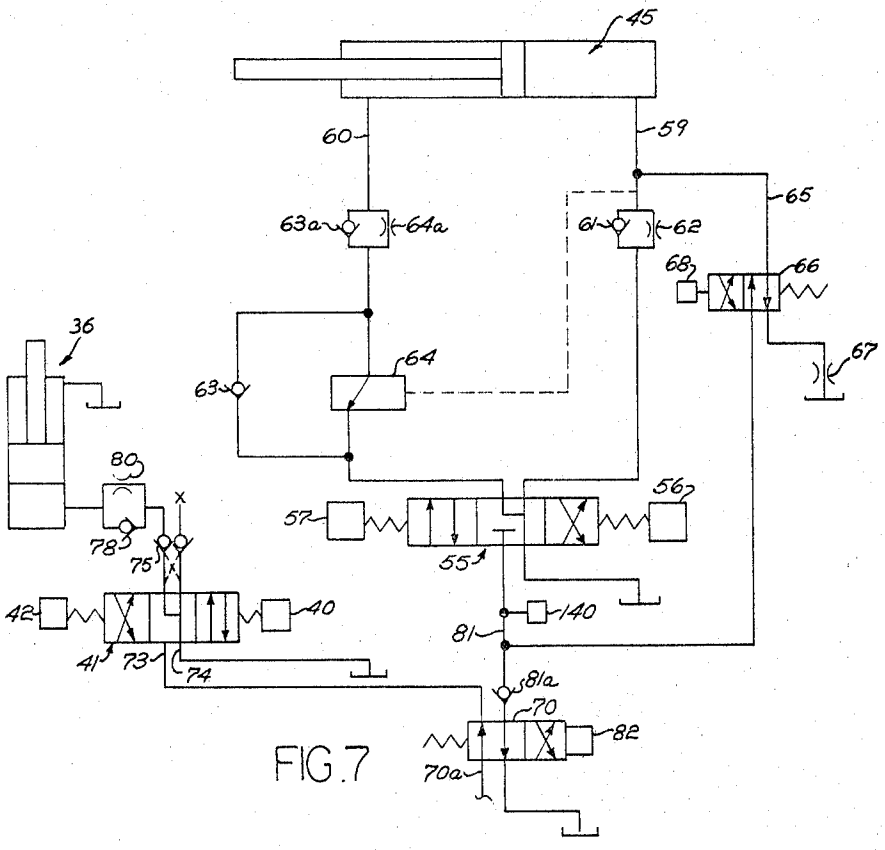


FIG. 7

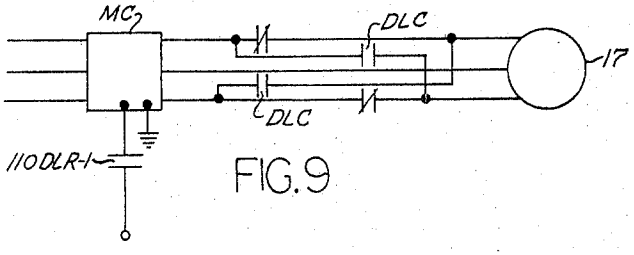


FIG. 9

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SHEET HANDLING MACHINE WITH CONTINUOUS DELIVERY

Filed Aug. 28, 1967 5 Sheets-Sheet 5

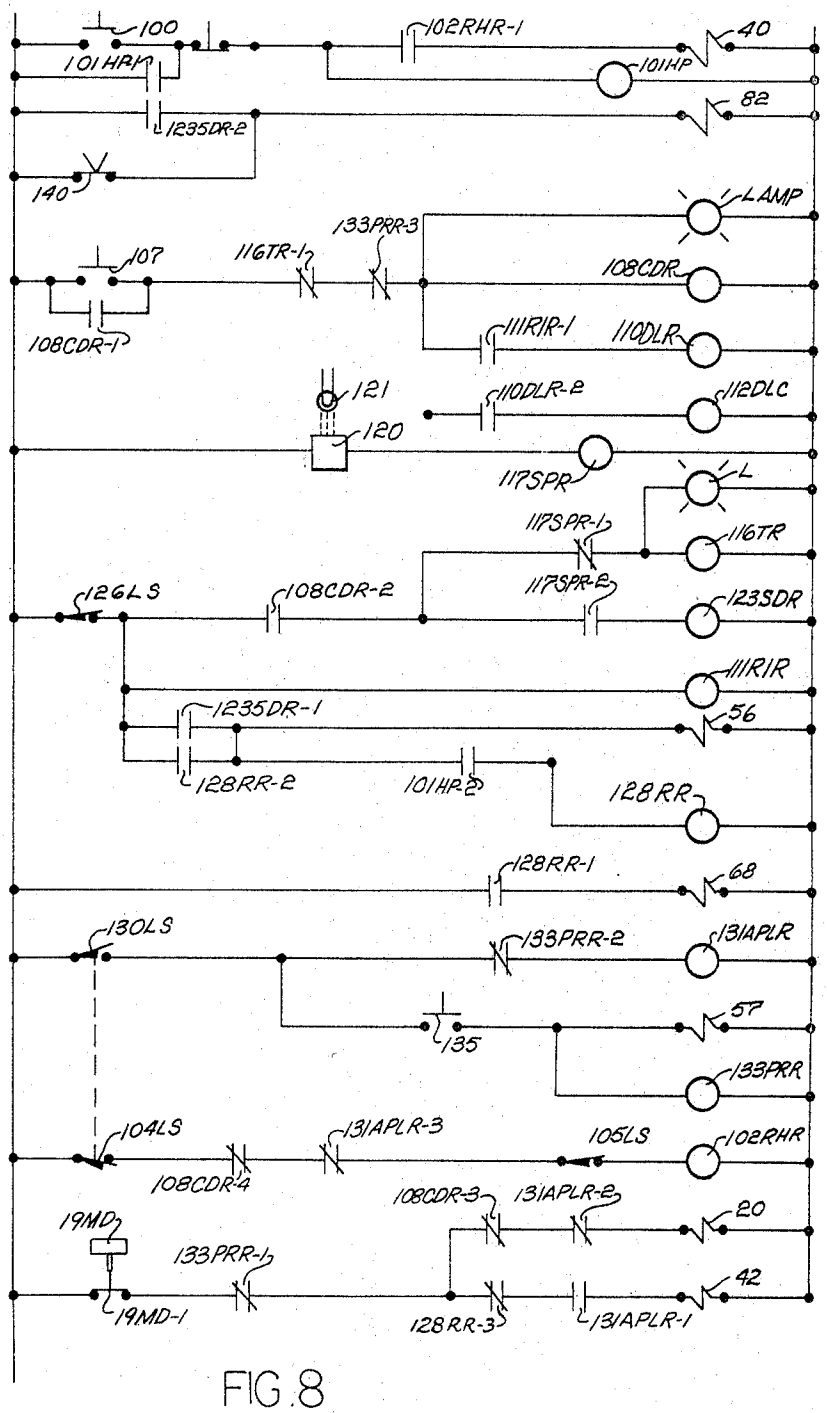


FIG. 8

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United States Patent Office 3,477,712
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3,477,712

SHEET HANDLING MACHINE WITH CONTINUOUS DELIVERY

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Filed Aug. 28, 1967, Ser. No. 663,762
Int. Cl. B65h 7/14
U.S. Cl. 271—88 14 Claims

ABSTRACT OF THE DISCLOSURE

A sheet delivery mechanism for a sheet processing machine in which an auxiliary pile support platen on an auxiliary hoist is inserted by power over the top of the pile on the main hoist. The control for inserting the platen includes pile detecting means for assuring that there is a clear path for the platen and means for disabling the pile height detector for automatically lowering the hoist onto which sheets are being piled. The power means for inserting the platen is multi-speed and operates at a high rate at the start of the insertion and a slow rate as the platen approaches a fully inserted position to process sheets. The operation of the sheet processing machine is not stopped during insertion or withdrawal of the platen.

The present invention relates to delivery mechanisms for sheet handling machines as printing presses for operating on sheets, particularly cardboard.

One of the problems in processing sheets is that of handling the sheets as they are delivered from the sheet processing machine. In sheet processing operations, such as printing, the sheets are conventionally delivered from the machine by a delivery mechanism which drops the sheets onto a skid on a delivery hoist to form a pile of sheets which periodically must be removed from the delivery mechanism. It is desirable that the pile of sheets be handled and removed without stopping or slowing the sheet processing machine and without losing sheets being delivered or disarranging the pile of sheets being formed. While auxiliary platens have been used to intercept the falling sheets to allow the pile of sheets on the skid to be removed while the delivery of sheets continues, problems in the form of sheet loss and pile disarrangement, have arisen in inserting the platen into the stream of falling sheets to properly position the latter to intercept the falling sheets.

An object of the present invention is to provide a new and improved delivery mechanism for a printing press or other sheet processing machine which is so construed and arranged that an auxiliary platen may be inserted over the top of the pile sheets being delivered to the main hoist of the delivery to intercept falling sheets and allow the pile on the main hoist to be changed without interrupting or slowing the printing operation and with a minimum loss of sheets due to the insertion of the platen.

A further object of the present invention is to provide a new and improved printing press in which the insertion of an auxiliary platen for intercepting sheets falling onto a delivery hoist is controlled so that the platen is initially moved at a high speed and then at a slow speed as the platen approaches its inserted position to minimize bouncing of the platen and pile disarrangement.

A further object of the present invention is to provide a new and improved delivery mechanism for a printing press in which the pile height detector for lowering the main delivery hoist as the pile builds up thereon and for controlling the lowering of an auxiliary hoist which supports an auxiliary platen for receiving the sheets being delivered while a pile is being removed from the main hoist, is rendered ineffective to control either hoist during the time that the auxiliary pile support is being removed and also preferably during insertion of the platen.

A further object of the present invention is to provide a new and improved delivery mechanism in which an auxiliary platen for intercepting sheets while the pile on the main hoist of the delivery is being removed is inserted by the power under a control which will effect an abortion of the insertion of the platen in the event that the control means does not see a clear path for the platen.

A still further object of the present invention is to provide a new and improved delivery mechanism in which an operation for inserting an auxiliary platen in response to a control signal is aborted and the main hoist maintained in a position for receiving sheets if control means for the operation does not sense that it is appropriate to effect an insertion of the platen.

The preferred embodiment of the present invention is described with reference to the drawings in which:

FIG. 1 is a schematic view of a printing press embodying the present invention;

FIG. 2 is a fragmentary side elevational view of the delivery of the printing press of FIG. 1;

FIG. 3 is a schematic view of mechanism for operating a hoist of the delivery;

FIG. 4 is a fragmentary sectional view through a portion of the delivery;

FIG. 5 is a fragmentary perspective view of a portion of the delivery shown in FIG. 2;

FIG. 6 is an illustrative view of mechanism for operating the auxiliary pile support of the delivery shown in FIG. 2;

FIG. 7 is a schematic hydraulic diagram for the delivery;

FIG. 8 is an electrical control diagram for the delivery; and

FIG. 9 is a schematic circuit diagram of circuitry for energizing the motor for operating the main hoist of the delivery.

The present invention relates to a printing press as shown in FIG. 1 which press includes a conventional continuous feeder **10** for feeding sheets of cardboard or the like to one or more printing units **12** for printing the sheets. The printed sheets are delivered from the printing units of a delivery mechanism **14** which includes a main delivery hoist **16** onto which sheets are stacked.

As shown in FIG. 2, the delivery mechanism **14** includes a conventional chain delivery **15** for delivering sheets from the printing press to a skid S on the main hoist **16**. The main hoist is supported in the delivery mechanism in a conventional manner to be raised and lowered by a motor **17** operated under the control of the operator. When sheets are being delivered to the skid on the main hoist, the main hoist is automatically lowered in response to a photocell detector **18**. As a pile of sheets builds up on the skid S on the main hoist, a light beam to the photocell detector is broken and the photocell detector provides a signal to effect an incremental lowering of the main hoist. As long as the light beam is not broken, the photocell detector does not operate to lower the hoist.

In the illustrated embodiment, the main hoist is shown as being lowered in response to the photocell detector by a pawl and ratchet mechanism. Referring to FIG. 3, the photocell detector **18** controls energization of a relay **19MD** having normally closed contacts **19MD-1** in a circuit for energizing a solenoid **20** for controlling the operation of the pawl and ratchet mechanism. The pawl and ratchet mechanism comprises an arm **21** which is reciprocated from the main drive of the press. The arm **21** has a pawl **22** pivoted thereto and adapted to cooperate with a

ratchet wheel 23 which is fixed to a shaft 24 that is rotatable to raise and lower the main hoist. The pawl 22 is, in the illustrated embodiment, biased to a position out of operative relationship with the ratchet wheel by a spring 25 and is moved into ratcheting position by the energization of the solenoid 20 which is connected between the arm 21 and the pawl 22.

Referring to FIGS. 2, 4 and 5, the delivery includes an auxiliary hoist or support comprising a pair of rails 26 for supporting an articulated auxiliary platen 28. The rails 26 extend forwardly and rearwardly of the press on the outside of the delivery so as not to interfere with the falling sheets. Each of the rails 26 is suspended by a cable 30 connected to the rail near its forward end and a cable 31 connected to the rail near its rearward end. The cables 30, 31 are trained around pulleys which are adapted to rotate relative to their supporting shafts and the cables are wound up on drums 34 on the opposite ends of a shaft 35. The weight of the rails 26 and weight of the auxiliary platen normally tend to unwind the cables from the wind-up drums 34. The drums, however, are controlled by a hydraulic cylinder 36 having a piston rod connected to a rack 37 which meshes with a gear 38 on the shaft 35 so that the pulleys cannot unwind unless the cylinder is communicating with the drain so that the piston rod can move into the cylinder. Normally, a solenoid 40 of a solenoid valve 41 controls the communication of the head end of the cylinder with the drain. The valve 41 is a three position valve and when the solenoid 40 is energized the head end of the cylinder is communicating with the drain to allow the piston rod to move inwardly of the cylinder to allow the hoist to lower. When a solenoid 42 is energized, the valve is shafted to supply pressure to the cylinder to cause the piston rod to move outwardly of the cylinder 36 to wind up the cables 30, 31 and raise the auxiliary platen and the rails 26. When neither solenoid is energized, the cylinder does not communicate with either the drain or pressure supply.

When the auxiliary platen is in position to receive sheets, the photocell detector for the main hoist is switched to control the solenoid 40 so that the platen is lowered in response to the detector as will be explained in more detail hereinafter.

The articulated platen 28 is made of a plurality of sections hinged together and supported on the rails by rollers 43. The hinged sections enable the platen to be moved rearwardly on the rails 26 to a position shown in dot-dash lines in FIG. 1. The articulated platen is moved on the rails 26 by the operation of a hydraulic piston cylinder motor 45, see FIG. 6, connected to drive chains 46, one on each side of the platen, for moving the auxiliary platen between its positions, see FIG. 5. Each chain 46 is connected to the auxiliary platen at its forward end, passes rearwardly over a respective sprocket 47 adjacent the rearward end of the rail 26, downwardly around a respective sprocket 48, upwardly around the respective sprocket 49 and then forwardly along the underside of the adjacent rail 26, over a respective sprocket 50 adjacent the forward end of the rail 26 and around a sprocket 51 to connect to the auxiliary platen adjacent to the connection of the other end of the chain. The described sprockets, etc., are duplicated for each of the chains 46. The sprockets 48 are on a shaft 48*a* and are rotated to move the platen. When the sprockets are rotated in one direction, the chains move the platen in and when rotated in the opposite direction the chains move the platen out. It will be noted that when the platen is in its withdrawn position, it does not interfere with sheets falling from the delivery mechanism. When the hydraulic cylinder 45 is operated, the piston of the cylinder moves a rack 52 which turns a cooperating gear 52*a* on a shaft 53 which has a bevel gear 54 thereon which meshes with a bevel gear 54*a* on the shaft 48*a* so that rotation of shaft 53 rotates the shaft 48*a* and sprockets 48.

The articulated platen is not shown or described in detail. Suffice it to say that the platen may be constructed in a manner similar to that shown in United States Patent No. 3,140,091, issued July 7, 1964 to Peter M. Reif and Robert E. Lindemann where the shafts for supporting the rollers constitute the hinge between platen sections.

The electro-hydraulic control for the hydraulic cylinder 45 for operating the platen is shown in FIG. 7. Referring thereto, hydraulic pressure is supplied to the cylinder 45 under the control of a hydraulic valve 55 which is a three position valve operated by two solenoids 56, 57. When neither solenoid is energized, the valve is in a position to conduct fluid from fluid conduits 59, 60 connected to the head and rod ends respectively of the hydraulic cylinder 45 to drain. When the solenoid 56 is energized, the valve 55 connects the conduit 59 to pressure and the conduit 60 to drain. Conversely, when the solenoid 57 is energized, the valve 55 connects the conduit 59 to drain and the conduit 60 to pressure. When the pressure is supplied to the conduit 59, the hydraulic cylinder operates in the direction to insert the platen.

When the pressure fluid is supplied from the valve 55 to the conduit 59, the pressure fluid flows through a check valve 61 which is paralleled by a flow restrictor 62 which restricts or adjusts the rate of the return fluid flow when the conduit 59 is connected to drain by the valve 55. Similarly, when pressure is supplied from the valve 55 to the conduit 60, it flows through check valves 63, 63*a*, which are respectively paralleled by a pressure responsive valve 64 and flow restrictor 64*a*. The flow restrictor controls the rate of fluid flow when the valve 55 is in or positioned to connect fluid from conduit 60 to drain. The valve 64 is opened in response to pressure in the conduit 59 to the head end of the cylinder.

Pressure fluid may also be supplied to conduit 59 by a solenoid valve 66 which has a connection to the conduit 59 through a conduit 65. The solenoid valve 66 is operated by a solenoid 68. When the solenoid is de-energized, the valve is in the position shown in FIG. 7 and connects the cylinder conduit 59 through the flow restrictor 67, to drain. When the solenoid 68 is energized, the solenoid valve 66 supplies fluid pressure to the conduit 59. On insertion of the auxiliary platen, both the solenoids 68 and 56 are initially energized and the supply of fluid pressure through the two lines to the cylinder conduit 59 provide for high speed operation of the cylinder 45 to effect insertion of the platen at a rapid rate. As the platen approaches its fully inserted position, the solenoid 56 is de-energized to return the solenoid valve 55 to its central position. This reduces the flow of fluid to the cylinder 45 and reduces the speed of movement of the platen as it approaches its fully inserted position. Preferably, the conduit 65 from the valve 66 is smaller than the conduits from the valve 55 and the conduit 59 to provide a more restricted flow. If insufficient restriction is provided by the conduit 65, a flow restrictor may be included in the pressure line to the valve 66. It will be also noted that the volume of fluid to the cylinder head end is also reduced when the valve 55 is returned to its central position in view of the fact that the flow restrictor 62, 30 will operate to allow part of the pressure fluid supplied through the valve 66 to be returned through the valve 55. During insertion of the platen, the pressure in the conduit 59 will operate the pressure responsive valve 64 to provide a by-pass around the check valve 63 for the return fluid from the conduit 60. When the valve 55 is shifted to its position connecting the conduit 59 to drain near the inserted position, the pressure in conduit 59 will drop and the valve 64 will partially close to restrict the flow from the rod end of the cylinder 45 to return to drain to provide a cushioned stop thereby minimizing any tendency of the platen to bounce.

To withdraw the platen, the solenoid 57 of the valve 55 is energized to supply pressure to the rod end of the cylinder 45 and to connect the head end to drain.

The hydraulic system also includes a solenoid valve 70 for controlling the supply of pressure fluid to the valve 55 and to the valve 41 for controlling the raising and

lowering of the auxiliary platen. The valve **70** is normally in a position to supply fluid pressure through a conduit **73** to the pressure port of the solenoid operated valve **41** for controlling the raising and lowering of the rails **26** for supporting the auxiliary platen. The valve **41** also has a return port **74** and the valve may be operated from its central position to connect a conduit **75** connected to a cylinder port of the valve **41** to either the pressure port or the drain port. When the solenoid **40** is energized, the conduit **75** is connected to the pressure conduit **73** and when a solenoid **42** is conduit **75** is connected to the drain conduit **74**. The conduit **75** is connected through a check valve **78** to the head end of the cylinder for raising and lowering the auxiliary hoist. The check valve **78** is paralleled by a flow restrictor **80** which controls the rate of flow of the fluid from the cylinder when the conduit **75** is connected to return by energization of the solenoid **42**.

Normally the valve **70** connects the pressure point of valve **41** to the source of fluid pressure but when solenoid **82** of valve **70** is energized this connects the conduit **73** between the pressure port of valve **41** and drain and it also connects the pressure port **90***a* of the valve **70** to the conduit **81** which is connected between the valve **70** and pressure port of solenoid valve **55** through a check valve **81***a*. Consequently, the solenoid valve **70** must be operated through a check valve **81***a* to supply pressure to the pressure port of valve **55** and when operated there is no fluid pressure supply to valve **41**. Thus, the cylinder **36** cannot be operated to raise the rails **26**. This prevents a raising of auxiliary rails and platen while the cylinder **45** is being operated to either insert or withdraw the platen.

During a printing run, the main hoist is lowered as a pile builds up thereon in response to the operation of the pawl and ratchet wheel **22**, **23** as described hereinbefore. When the pile has built up to a level where it is desirable to remove the pile from the main hoist, a continuous delivery operation may be initiated by first depressing a push button switch **100**, see FIG. 8, to energize a pump relay **101**HP to start the pump for the hydraulic system. The relay **101**HP has holding contacts **101**HP–**1** around the push-button switch **100** to hold the relay energized. In addition to energizing the relay **101**HP, the actuation of the push-button switch **100** also energizes solenoid **40** to cause the rails **26** to be raised to their uppermost position if already not so positioned. The energization of solenoid **40** is through contacts **102**RHR–**1** of a relay **102**RHR which is normally energized through a limit switch **104**LS when the platen is in a withdrawn position. When or if the rails **26** are in their uppermost position, they open a limit switch **105**LS in series with the relay **102**RHR to de-energize the solenoid **40**. The pump may be normally operating during a printing run.

The operator next depresses continuous delivery start push-button **107** to effect the energization of a continuous delivery control relay **108**CDR. Energization of the relay **108**CDR closes holding contacts **108**CDR–**1** around the push-button switch **107** to hold the relay energized. At the same time that the relay **108**CDR is energized by operation of the push-button switch **107**, a motor control relay **110**DLR for the main hoist will also normally be energized by a circuit through the switch and through normally open contacts **111**RIR–**1**, which are now closed as described hereinbelow, of a relay **111**RIR. The contacts **111**RIR–**1** connect the relay **110**DLR in parallel with the relay coil **108**CDR. The relay **111**RIR is normally energized when the auxiliary platen is not in an inserted position so that the contacts **111**RIR–**1** are normally closed at the start of a continuous delivery operation. The energization of the relay **110**DLR closes contacts **110**DLR–**1**, see FIG. 9, in a circuit for energizing the operating coil of a motor contactor MC and contacts **110**DLR–**2** in circuit for energizing a motor reversing relay **112**DLC. The relay **112**DLC operates to reverse the phase connections to the main hoist motor **17** to cause the hoist to lower at a fast down rate when the motor contactor MC is energized. The motor contactor is schematically indicated in FIG. 9. FIG. 9 also shows the phase reversing contacts DLC of the relay **112**DLC and the contacts **110**DLR–**1**. Consequently, when the push-button switch **107** is depressed, the main hoist, due to the operation of the relays **110**DLR and **112**DLC will immediately start to lower the main hoist at a fast rate.

The energization of the continuous delivery control relay **108**CDR, also closes its normally open contacts **108**CDR–**2** to energize an abort relay **116**TR through normally closed contacts **117**SPR–**1** of a detecting relay **117**SPR. The detecting relay **117**SPR is energized when the top of the pile on the main hoist falls below the bottom of the rails **26** by a light beam which strikes a photocell **120**. The photocell **120** is positioned on the bottom of one of the rails **26** and a light **121** is positioned on the bottom of the other rail. As long as the pile is between the rails, the light does not strike the photocell but when the main hoist is lowered a sufficient distance to allow the light to strike the photocell, the relay **117**SPR is energized to open its contacts **117**SPR–**1** to de-energize the relay **116**TR and to close its contacts **117**SPR–**2** to energize a platen insert control relay **123**SDR. The light will strike the photocell **120** even though the sheets are falling through the beam from the light **121**. Consequently the photocell **120** will see the space between the sheets. Sheets particularly when of a heavier stock such as cardboard will fall in such a manner that the photocell **120** will see the space between the sheets to effect the energization of the relay **123**SDR.

The energization of the relay **123**SDR closes its contacts **123**SDR–**2** for energizing solenoid **82** of solenoid valve **70** to supply fluid pressure to the solenoid valves **55**, **66** and its contacts **123**SDR–**1** in a circuit which is made through a platen limit switch **126**LS. The limit switch **126**LS is normally closed when the platen is not in an inserted position and the closing of contacts **123**SDR–**1** energizes the solenoid **56** of the valve **55** for supplying pressure fluid to the cylinder **45** to effect an insertion of the platen. The closing of the contacts **123**SDS–**1** to energize the solenoid **56** also effects the energization of a rapid relay **128**RR through the contacts **101**HP–**2** of the relay **101**HP which was energized before the start of the continuous delivery operation to start the fluid pump. The energization of rapid relay **128**RR closes its contacts **128**RR–**1** to energize the solenoid **68** of the solenoid valve **66** and also it holding contacts **128**RR–**2** to keep the relay energized until the platen is inserted even though the relay **123**SDR should be de-energized by the detecting relay **117**SPR. The energization of relay **128**RR also opens its normally closed contacts **128**RR–**3** in the circuit for energizing solenoid **42** so that the auxiliary hoist cannot be lowered during platen insertion.

The relay **116**TR, which was energized upon the energization of the continuous delivery control relay **108**CDR and which was denergized when the detecting relay was energized in response to the pile on the main hoist clearing the rails **26**, operates with a time delay when energized to open its normally closed contacts **116**TR–**1** in the circuit for de-energizing the control relay **108**CDR. Consequently, if the relay **117**SPR is not operated to signal that the main hoist has cleared the bottom of the rails **26** within the time delay for the operation of the relay **116**TR, the opening of the contacts **116**TR–**1** will effect a de-energization of the control relay **108**CDR and prevent the energization of the platen insert relay **123**SDR by opening its contacts **108**CDR–**2** which in turn will prevent the energization of the solenoid **56** and the solenoid **68** and abort the platent insert operation. The relays **110**DLR and **112**DLC will also be de-energized to immediately stop the lowering of the main hoist. At this time the top of the pile on the main hoist will still be at a level where it can properly receive sheets from the

chain delivery **15** and, therefore, the operation of the press need not be interrupted and sheets are not lost. The operator, when this situation occurs, may operate the main hoist motor **17** to reposition the top of the pile at the desired level and check for any problem which may have caused the abortion of the operation. After such a check, he need merely depress the switch **107** to again initiate an operation to insert the platen. To aid the operator, the relay **116**TR is paralleled by an indicator light L which is lighted as long as the relay **116**TR is energized. If the light is not quickly extinguished upon the operation of switch **107** to effect the platen insertion, the operator may anticipate that there will be an abortion of the operation.

If the operation is not aborted, as the auxiliary platen approaches an inserted position, it operates the limit switch **126**LS to de-energize the solenoid **56** of the solenoid valve **55** and the relay **128**RR for controlling the valve **66**. The relay **128**RR drops out with a time delay so that the solenoid **68** of the valve **66** will remain energized for a period of time after the limit switch **126**LS is operated to supply fluid pressure to the platen cylinder **45** to operate the latter at a slower speed. The limit switch **126**LS is located so that it will be actuated before the platen reaches its fully inserted position and when it is operated, the speed of operation of the cylinder **45** will slow since the solenoid valve **55** is returned to its center position while the solenoid **68** of the solenoid valve **66** is maintained energized during the period required for the contacts **128**RR–**1** of the relay **128**RR to open and de-energize the solenoid **68**. This period is of sufficient duration to assure full insertion with the final speed being sufficiently slow to avoid adverse effects due to bouncing, etc.

When the rack leaves its withdrawn position at the start of the insertion operation, the limit switch **104**LS is opened and a limit switch **130**LS which is interconnected with the limit switch **104**LS is closed. The closing of the limit switch **130**LS effects the energization of a relay **131**APLR through normally closed contacts **133**PRR–**2** of a relay **133**PRR. The energization of the relay **131**APLR closes its contacts **131**APLR–**1** into a circuit for energizing the solenoid **42** to effect a lowering of the rails **26** and the auxiliary platen thereon in response to the operation of the pile height detector **18**. Consequently, the pile height detector **18** now operates to control the rails **26** and the rack thereon.

The relay **131**APLR also has contacts **131**APLR–**2** in the circuit for energizing the solenoid **20** to prevent the pile height detector **18** from operating the main hoist, see FIG. 3. It should also be noted that the relay **108**CDR has normally closed contacts **108**CDR–**3** in series with the solenoid **20** so that the operation of the continuous delivery control relay **108**CDR will render the photocell detector **18** ineffective to effect a control of the main hoist through operation of the pawl and ratchet mechanism **22**, **23**.

After the pile has been removed from the main hoist, the main hoist is raised to a position immediately below the rails **26** preparatory to withdrawing the auxiliary platen. The main hoist can be raised at this time since the opening of the limit switch **126**LS on the insertion of the auxiliary platen de-energized the relay **111**RIR which in turn opened its contacts **111**RIR–**1** in the circuit for energizing relay **110**DLR to de-energize the relay **110**DLR to stop the automatic lowering of the main hoist. The de-energization of relay **110**DLR opens contacts **110**DLR–**2** to effect the de-energization of the relay **112**DLC for reversing the phase to the motor. The operator, therefore, has full control of the hoist and may raise and lower the hoist at his will by operating the conventional controls for the motor **17**.

After the pile has been removed from the main hoist, it is disposed below the rails **26** preparatory to withdrawing the auxiliary platen to drop the pile which has been formed thereon onto the main hoist. When the main hoist is so positioned a push-button switch **135** is depressed by the operator to energize the solenoid **57** of valve **55** to shift the valve and supply fluid pressure to the rod end of hydraulic cylinder **45** to effect a withdrawal of the platen. The operator in the illustrated circuit must hold the switch depressed during platen withdrawal. The closing of switch **135** also energizes the relay **133**PRR.

The energization of the relay **133**PRR when the push-button switch **135** is depressed to cause the withdrawal of the platen opens its contacts **133**PRR–**1** in the circuit from the relay contacts **19**MD–**1** so that the pile height detector cannot effect energization of the solenoid **20** or of the solenoid **42**. This effectively disables the pile height detector **18** during platen withdrawal. The relay **133**PRR also has contacts **133**PRR–**2** in the circuit for energizing the relay **131**APR which are opened to de-energize this relay.

When the rack is fully returned to its withdrawn position, the platen return switches **104**LS, **130**LS are operated to open the limit switch **130**LS, which de-energizes the solenoid **57** and the relay **133**PRR, and to close the limit switch **104**LS. The closing of the limit switch **104**LS operates to energize the relay **102**RHR to close its contacts in the circuit for energizing the solenoid **40** for causing the rails **26** and the auxiliary platen to be elevated to their uppermost position.

It will be noted that the relay **108**CDR has normally closed contacts **108**CDR–**4** and the relay **131**APLR has normally closed contacts **131**APLR–**3** in the circuit for energizing the relay **102**RHR to insure that the solenoid **40** for raising the rails **26** cannot be energized during the continuous delivery operation until the appropriate time.

The energization of the relay **133**PRR at the start of the withdrawal operation also opens its contacts **133**-PRR–**3** in the circuit for energizing the relay **108**CDR to de-energize the continuous delivery control relay. This breaks one of the circuits for energizing the solenoid **82** of the valve **70** through the contacts **123**SDR–**2** since relay **123**SDR is de-energized by the opening of control relay contacts **108**CDR–**2**. This does not cause the de-energization of solenoid **82** since the contacts are paralleled by a low pressure switch **140** which is responsive to the pressure in the conduit **81** which will be low until the platen is returned to its withdrawn position where the platen returns. The pressure in the conduit **81** is normally maintained at a high pressure by an accumulator ACC but will drop whenever any of the valves have been operated to supply fluid pressure to the cylinder **45** and will be sufficiently low to actuate the switch **140** until the platen or cylinder reaches the limit of its movement in the direction in which it is operating. It will be noted that if the pressure in the accumulator ACC drops due to leakage, the low pressure switch **140** will close to operate the valve **70** to charge the accumulator. The switch **140** opens at a predetermined pressure which is higher than that at which it closes.

It has been shown that a delivery mechanism constructed in accordance with the present invention can be operated to insert the platen and subsequently withdraw it while the sheet processing machine constructed to process sheets at its regular operating speed with a minimum of lost sheets and without significantly disarranging the sets of sheets.

What is claimed is:

1. A delivery mechanism for receiving sheets from a sheet processing machine and including a main hoist onto which the sheets are stacked, an auxiliary pile support, support means supporting said auxiliary pile support for insertion movement from a withdrawn position clear of the sheets being delivered to said main hoist to an active position over the hoist to intercept and support the sheets being delivered to said hoist and for return withdrawal movement, multi-speed power actuated means for moving

said auxiliary pile support between its withdrawn position and its active position for receiving sheets, control means for said multi-speed power actuated means for operating said power actuated means at a fast speed to move the auxiliary pile support from its withdrawn position and at a slow speed as the latter approaches its said active position.

2. A delivery mechanism as defined in claim 1 wherein said control means comprises means for detecting the approach of said auxiliary pile support to its said active position and for changing the speed of said power actuated means.

3. A delivery mechanism as defined in claim 1 wherein said power actuated means comprises a hydraulic actuator and said control means comprises means for supplying fluid pressure at a high rate to operate said cylinder at one speed and at a lower rate to operate said cylinder at a lesser speed as it approaches its active position.

4. A delivery mechanism as defined in claim 3 wherein said control means comprises control elements for detecting the approach of said auxiliary pile support to its said active position, first valve means operated responsive to said control elements to immediately reduce the flow of pressure fluid for producing operation of said actuator and second valve means operated with a time delay in response to said control elements to stop operation of said actuator.

5. A delivery mechanism as defined in claim 1 including pile-height detecting means, means selectively responsive to said pile-height detecting means to automatically lower said main hoist, means selectively responsive to said pile-height detecting means to automatically lower said auxiliary support pile and said support means therefor, and control means for switching said detector between controlling said main hoist and controlling said auxiliary pile support and the support means therefor including means for disabling said pile-height detecting means during movement of said auxiliary pile support to its withdrawn position.

6. A delivery mechanism as defined in claim 1 including sensing means for sensing the lowering of the main hoist to position the top of the pile thereon below the path of the auxiliary pile support and means for preventing the insertion of said auxiliary pile support if the path thereof is obstructed for a predetermined time after operation of said control means to initiate the insertion of said platen.

7. A delivery mechanism as defined in claim 1 including control means for effecting the insertion of said pile support includes control elements for preventing insertion of said auxiliary pile support when the path thereof is obstructed by a pile on said main hoist.

8. A delivery mechanism for a sheet processing machine for receiving sheets from a machine and including a main hoist onto which the sheets are stacked, an auxiliary pile support, support means supporting said auxiliary pile support for insertion movement from a position clear of the sheets being delivered to said main hoist to an active position over the hoist to intercept and support the sheets being delivered to said hoist and for return withdrawal movement, power actuated means for moving said auxiliary pile support between its withdrawn position and its active position for receiving sheets, and control means for effecting the insertion of said auxiliary pile support including a control element responsive to the operation of said control means to lower said main hoist and initiating means responsive to the lowering of the top of the pile on said main hoist to a predetermined position to effect the operation of said power actuated means to insert said pile support.

9. A delivery mechanism as defined in claim 8 wherein timing means is initiated in response to the operation of said control means for disenabling said initiating means to effect insertion of said platen when said initiating means is not operated within a predetermined time after the actuation of said control means.

10. A delivery mechanism for a sheet processing machine for receiving sheets from a machine and including a main hoist onto which the sheets are stacked, an auxiliary pile support, support means supporting said auxiliary pile support for insertion movement from a position clear of the sheets being delivered to said main hoist to an active position over the hoist to intercept and support the sheets being delivered to said hoist and for return withdrawal movement, power actuated means for moving said auxiliary pile support between its withdrawn position and its active position for receiving sheets, and control means for effecting the operation of said power actuated means to insert said pile support including control elements for preventing insertion of said auxiliary pile support when the path thereof is obstructed by a pile on said main hoist.

11. A delivery mechanism according to claim 10 wherein said control means includes means responsive to the actuation of said control means to lower said main hoist and said control elements are responsive to the lowering of said hoist to position the top of the pile thereon below a predetermined level to enable the insertion of said platen.

12. A delivery mechanism as defined in claim 11 wherein timing means is actuated in operation of said control means to prevent insertion of said pile support when said control elements have not enabled insertion of said platen within a predetermined time after actuation of said control means.

13. The method of operating a delivery mechanism for a sheet processing machine in which sheets are dropped onto a main hoist which is lowered by a pile height detector as the pile builds up thereon to maintain the top of the pile between predetermined levels and in which an auxiliary platen on an auxiliary hoist is inserted into a position over the pile on the main hoist when the pile on the latter is to be removed to intercept falling sheets and form a pile and is then withdrawn after the removal of the pile on the main hoist to deposit the pile on the auxiliary hoist onto the main hoist, the improvement comprising inserting the auxiliary platen by operating power means for moving the platen at a first speed and changing the speed of the power means as the platen approaches an inserted position to approach the inserted position at a reduced speed.

14. The method defined in claim 13 wherein said pile height detector is disabled during insertion and withdrawal of said platen.

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