

March 17, 1959

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STACKING DEVICE FOR SHEET PRINTING MACHINES

Filed July 30, 1957

3 Sheets-Sheet 1

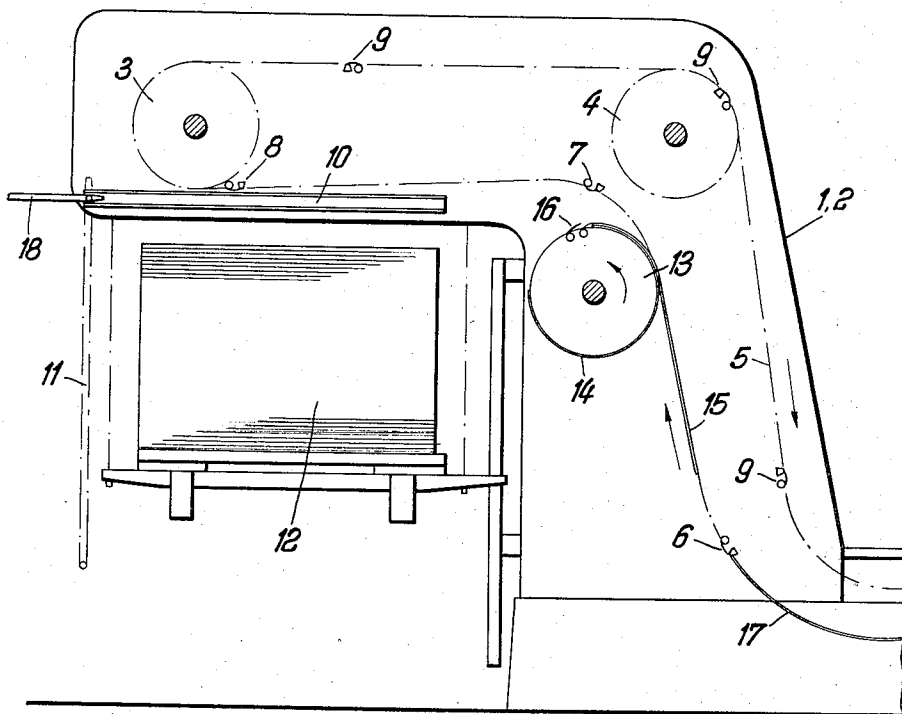


Fig. 1

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3 Sheets-Sheet 2

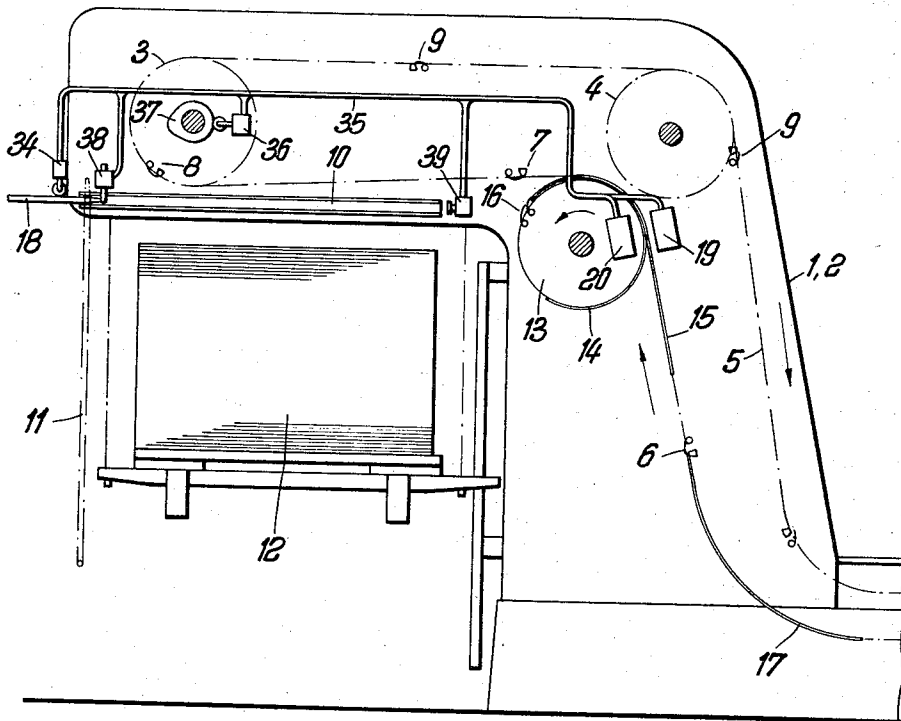


Fig. 2

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3 Sheets-Sheet 3

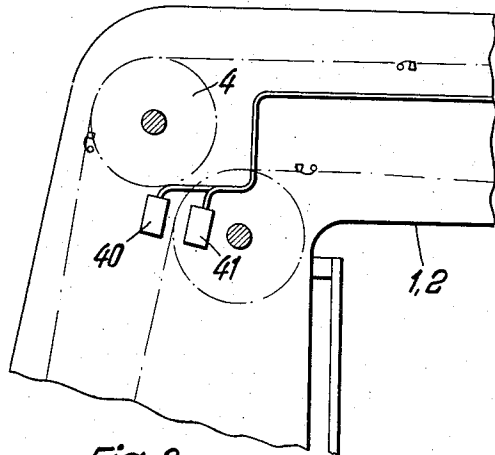


Fig. 3

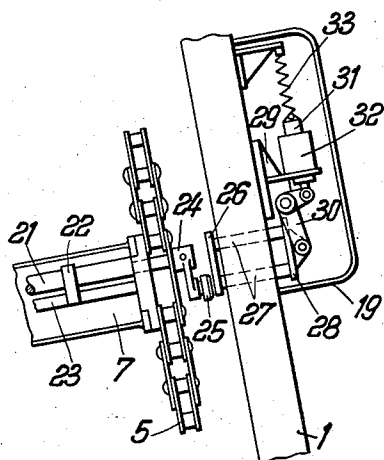


Fig. 5

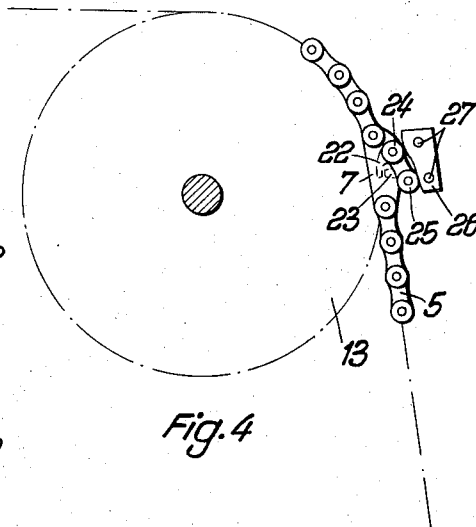


Fig. 4

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STACKING DEVICE FOR SHEET PRINTING MACHINES

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Claims priority, application Germany August 18, 1956

7 Claims. (Cl. 271—79)

This invention relates to the stacking devices of sheet printing machines and has particular reference to such stacking devices in which means are provided to exchange the stacking table during the continued operation of the printing machine. In a conventional device of this kind auxiliary stacking tables are employed which are in the shape of thin plates, grates, or the like and which are temporarily moved into position above the main stack of printed sheets so that the stacking of sheets can be continued while the main stacking table with the stack of finished sheets thereon is removed and exchanged against a new main stacking table. The auxiliary stacking table is then withdrawn from its position and the sheets which, meanwhile, have collected thereon, are now allowed to fall onto the new main table, to be followed in turn by the newly arriving sheets. All this takes place while the machine is in operation.

These and similar types of stacking table exchanging devices are subject to various disadvantages, of which some are occasioned by the very short time available between the delivery of two successive sheets, within which interval the auxiliary stacking table must be introduced into the stacking device above the stack on the main table. It is, therefore, a main object of the invention to eliminate this disadvantage and to provide a stacking table exchanging device in which ample time will be available for the introduction of the auxiliary table during the continued operation of the printing machine without interference by the steadily arriving new sheets.

A further discrepancy of the devices at present in use is the fact that with sheets of large size or of thin or limp material it is almost impossible to exchange the stacking table at full speed of the machine. The succession of the arrival of the sheets is so quick that the auxiliary table, while being pushed into position, can not avoid crushing one or two of the sheets instead of receiving them in an orderly, flat condition. The invention also eliminates this drawback by the provision of retaining or collecting means, which retains one or more of the sheets before they are allowed to be deposited on the stack, and thereby prevent these sheets coming into contact with the auxiliary stacking table until the latter has been properly moved into position.

In a preferred form of a device in accordance with this invention a retaining cylinder is provided, which cooperates with the sheet conveyors, such as chains and grippers, at timed intervals in such a manner as to prevent the stacking of sheets during the time in which the auxiliary table is moved into its operating position, so that during this time no sheets are being delivered.

In this way there will be sufficient time available for the introduction of the auxiliary stacking table even at the highest speed of the printing machine. The last sheet on the main stack can be placed in completely flat condition so as not to interfere with the introduction of the auxiliary table, which can be done at considerable leisure prior to the arrival of the next sheet.

For that purpose the invention serves the further object of providing means by which the retained sheet, or sheets,

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after the auxiliary table has been placed into position, is or are transmitted from the retaining cylinder to the next approaching chain gripper in order to be stacked together with the sheet already carried by same.

A still further object of the invention rests in the provision of control means for causing the retaining member to become effective at the moment when the auxiliary table is placed in readiness for its introduction above the stack on the main stacking table. Use is made, by preference, of means which become effective immediately after the auxiliary stacking table has only slightly been introduced into the stacking device or, as an alternative, when it is being tipped from a vertical position of rest into a horizontal sliding-in position.

It is also possible, as a still further object of the invention, to terminate the action of the retaining or collecting cylinder automatically and to transmit the retained sheet, or sheets, to the succeeding chain gripper also under the control of the introduction of the auxiliary stacking table, for instance by establishing electric contacts shortly before the auxiliary stacking table assumes its final position over the main stack.

Another, modified, object of the invention is the provision of a locking device which admits the introduction of the auxiliary stacking table over the stack on the main table only after the retaining cylinder has become operative and no sheets being delivered.

Summarizing the various objects of the invention and the means indicated for their realization, it must be emphasized that with these means the operator will be in the position of devoting his full attention to the orderly introduction of the auxiliary table into the stacking device, while the retaining member becomes effective automatically as the auxiliary table is being introduced.

With the aforesaid and other objects and improvements in view the invention substantially consists in the device hereinafter described and of which several modifications are diagrammatically illustrated in the accompanying drawings. It will be understood, that these drawings illustrate the invention by way of example only and that various deviations may be resorted to within the scope and the meaning of the claims appended at the end of this specification.

In the drawings,

Fig. 1 illustrates a stacking device in accordance with the invention comprising a chain conveyor in longitudinal section.

Fig. 2 is a modified form of Fig. 1 in which automatic control means are provided for starting and terminating the operation of the retaining cylinder.

Fig. 3 is a side view of a part of Fig. 2 at 180° in relation to that figure.

Fig. 4 shows the gripper opening and closing means in side elevation, while

Fig. 5 is a view at right angles thereto.

Referring to Fig. 1 in particular, 1 and 2 are the side walls of the stacking device in the upper part of which chain wheels 3 and 4 are arranged to guide the chain 5 with its sets of grippers 6, 7, 8 and 9 from the printing machine to the stacking device. Also arranged on the side walls 1 and 2 are guides 10 for the auxiliary stacking table 11 which, when not in use, is suspended in vertical position at the entrance of the said guide as indicated by the broken lines. The sheets, as they are conveyed from the printing machine (not shown) to the stacking device 12, are caused to pass a cylinder 13, hereinafter referred to as the retaining cylinder, and upon which the sheets are temporarily retained. Fig. 1 shows a sheet 14, which has been delivered by the gripper 8 to be already on the retaining cylinder 13, while the sheet 15 which has been delivered by the gripper 7 is just being transferred to the

gripper 16 of the retaining cylinder. It will be seen that its foremost part rests already on the cylinder 13. This means that during the passage of the grippers 8 and 7 no sheets are stacked and that there is ample time for the operator to slide the auxiliary stacking table 11 into the guide 10 over the main stack. In some cases it may be sufficient to retain only one sheet on the cylinder 13 while, on the other hand, more than two sheets, for instance three or four, may temporarily be retained if necessary.

In the continued operation of the machine the sheets, 14 and 15 for example, which have been retained by the cylinder 13, will be transmitted to the grippers 6, eventually to be deposited onto the meanwhile positioned auxiliary stacking table 11 together with the sheet 17 already conveyed by the said gripper 6.

During the time of the normal operation of the machine the retaining cylinder 13 is put at rest, for instance by shifting it out of the path of the chain grippers, or by being turned circumferentially in the direction of feed to such an extent as will prevent grippers 6 to contact with the leading edges of the sheets. Simultaneously herewith the control mechanism for the grippers 16 of the retaining cylinder and for the chain grippers are moved out of operation, while the cylinder is put into operation preferably by a control mechanism which responds to the tipping-up of the auxiliary table 11 into its horizontal working position 18. Examples of these means will be described in more detail as this specification proceeds.

While in the embodiment shown in Fig. 1 the retaining cylinder 13 is arranged approximately in the position in which the upwardly moving branch of the conveyor chain 5 curves into the horizontal, the modification illustrated in Fig. 2 shows a stacking device in which the position of the retaining cylinder 13 coincides directly with the place at which the vertical branch of the chain curves off into the horizontal. The chain wheels for the guidance of the conveyor chains 5 are arranged at both ends of the cylinder 13 (Fig. 4) which, therefore, receives its movement directly from these chains. In the normal operation of the stacking device the grippers 6, 7, 8 and 9 are, as usual, opened only in their position directly above the stack of sheets 12. But when it is desired to retain sheets on the retaining cylinder 13, it will be necessary for these grippers to be opened when they reach the cylinder, and for the otherwise open gripper 16 of the retaining cylinder to be closed. The mechanism for the opening of the chain grippers is arranged in a box or housing 19, and for the closing of the gripper 16 in a housing 20.

Fixed at both sides of the machine to the chains 5 is the gripper assembly 7 (Figs. 4 and 5) in which the grippers 22 are arranged to hold the sheets in contact with the gripper bar 23. The grippers 22 are pivoted on, or turnable with, the gripper shaft 21, to the end of which is fitted a lever 24 bearing a roller 25, adapted to cooperate with a control cam 26 which is slidable by means of two studs 27 in the side wall 1. At the outside of the sidewall these studs are connected by a crosspiece 28 (Fig. 5). A bracket 29 is arranged in the housing 19 to which is attached a small bell crank lever 30, the one arm of which is connected to the cross piece 28 and the other with the armature 31 of a lifting magnet 32. A tension spring 33 is provided to attract the armature when it is without current and to pull the control cam at the free ends of the studs 27 to the right, in which position it is out of the path of the roller 25 so that the grippers 22 remain closed. As soon, however, as the magnet 32 receives current, its armature 31 moves downwardly and thereby shifts the control cam 26 to the left into the path of the roller 25, so that the grippers open when their assemblies 6, 7, 8 and 9 pass the cam 26.

When the auxiliary stack table is turned into its horizontal position 18, it comes into contact with the switch 34 (Fig. 2). This causes a current to flow through the

magnet 32 and to thereby move the control cam via the armature 31 and the bell crank lever 30 to the left (Fig. 5). Simultaneously a similar device in the housing 20 is supplied with current through which a control cam for the gripper 16 of the retaining cylinder 13 comes into action so as to close the gripper 16. This causes the sheets to be transmitted from the gripper 22 to the gripper 16 of the retaining cylinder 13.

Provided in the conduit 35 between the switch 34 and the magnet 32 in the housing 19, and between the corresponding magnet in the housing 20, is a switch 36 which is actuated by the control cam 37 on the shaft of the chain wheels 3. This switch prevents the control cam 36 and the corresponding cam for the gripper 16 to be moved into the path of the roller 25 of the chain gripper, or of the roller of the gripper 16, when these rollers are just in front of their respective cams.

In the guide 10 of the auxiliary stacking table 11 is a magnet-operated bar 38 (Fig. 2), which is actuated via a delay-contact (not shown) by the switch 34 and which locks the auxiliary table from being pushed into the guide until the control cams for the grippers 22 and 16 are in action and no sheet deposited on the stack.

After the auxiliary stacking table has been slid into its end position over the stack 12, it comes into contact with the switch 39, which causes the magnets in the housings 19 and 20 to become without current and the retaining of sheets on the cylinder 13 to be interrupted. At the same time two magnets in the housings 40 and 41 on the opposite side of the stacking device (Fig. 3) receive current over the switch 36. These housings 40 and 41 are also provided with mechanism similar to Figs. 4 and 5, by which control cams are moved into the path of rollers for opening and closing the grippers 22 and 16 respectively. In this way the sheets which have been retained on the cylinder 13 are handed over to the next approaching chain gripper assembly and deposited on the stack 12 together with the sheets already carried by these grippers, whereupon the said control cams are automatically returned into their inoperative positions as shown in Fig. 5.

What I claim is:

1. In a stacking device for sheet printing machines having an exchangeable main stacking table and means for moving an auxiliary stacking table into position over a stack of sheets on the main stacking table during the exchange of the latter while the printing machine remains in operation, and a conveyor for delivering sheets from the printing machine to the stacking device, a retaining cylinder intermediate the printing machine and the stacking device, and means on the said retaining cylinder for receiving and temporarily withholding the sheets during the introduction of the auxiliary stacking table so that no sheets will be delivered during such introduction.

2. A stacking device for sheet printing machines as set forth in claim 1, in which means are provided in cooperation with the auxiliary stacking table for causing the operation of the said retaining cylinder to commence by the introduction of the auxiliary stacking table into the ready-for-work position over the main stack.

3. In a stacking device for sheet printing machines having an exchangeable main stacking table for supporting a stack of sheets thereon and an auxiliary stacking table for temporarily supporting sheets during the exchange of the main stacking table, a retaining cylinder intermediate the printing machine and the said stacking device for temporarily withholding a predetermined number of sheets prior to their being delivered to the auxiliary stacking table, a chain for driving said retaining cylinder, sheet grippers in spaced relation on said chain for conveying sheets from the printing machine to the stacking device, means for opening and closing said grippers, and electrically controlled means for effecting said opening and closing in timed relation to the operation

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of the said retaining cylinder so as to transmit sheets from the chain grippers to the cylinder grippers during the introduction of the auxiliary stacking table, and from the cylinder grippers to a succeeding chain gripper after the said auxiliary stacking table has been moved into position.

4. In a stacking device for sheet printing machines having an exchangeable main stacking table for supporting a stack of sheets thereon and an auxiliary stacking table for temporarily supporting sheets during the exchange of the main stacking table, a retaining cylinder intermediate the printing machine and the said stacking device for temporarily withholding a predetermined number of sheets prior to their being delivered to the auxiliary stacking table, and a locking device admitting of the introduction of the auxiliary stacking table over the main stack only when the stacking cylinder is in operation to withhold sheets and to temporarily prevent their delivery onto the said auxiliary table.

5. In a stacking device for sheet printing machines having an exchangeable main stacking table for supporting a stack of sheets thereon and an auxiliary stacking table for temporarily supporting sheets during the exchange of the main stacking table, a retaining cylinder intermediate the printing machine and the said stacking device for temporarily withholding a predetermined number of sheets prior to their being delivered to the auxiliary stacking table, and control means effective at about the arrival of the auxiliary stacking table in its

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end position over the main stack for interrupting the retention of the sheets by the retaining cylinder and causing the transfer of the already retained sheets from the said retaining cylinder to the next approaching chain gripper.

6. In a stacking device for sheet printing machines as set forth in claim 3, a roller on each of the said chain grippers, a displaceable control cam on a stationary part of the stacking device, and means for moving the said control cam into cooperation with the said rollers for opening and closing the said chain grippers in timed relation to the introduction of the auxiliary stacking table over the main stacking table.

7. In a stacking device for sheet printing machines as set forth in claim 3, a roller on each of the said chain grippers, a displaceable control cam on a stationary part of the stacking device, an electromagnet, an armature on said electromagnet, and a linkage between said armature and said control cam for moving the said control cam in relation to the said roller for opening and closing the said chain grippers in timed relation to the introduction of the auxiliary stacking table over the main stacking table.

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