

Aug. 12, 1958

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2,847,215

STACKING DEVICE FOR PRINTING MACHINES

Filed Dec. 9, 1954

4 Sheets-Sheet 1

Fig. 1

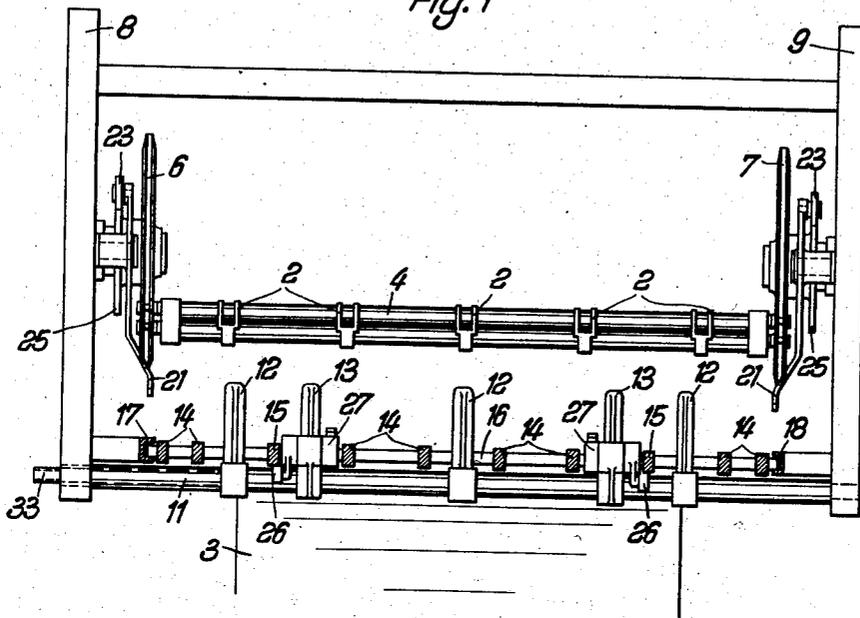
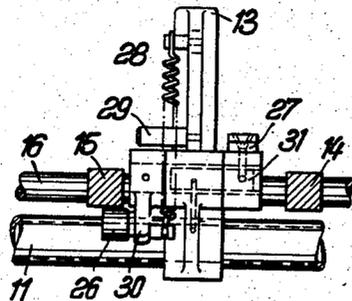


Fig. 3



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4 Sheets-Sheet 3

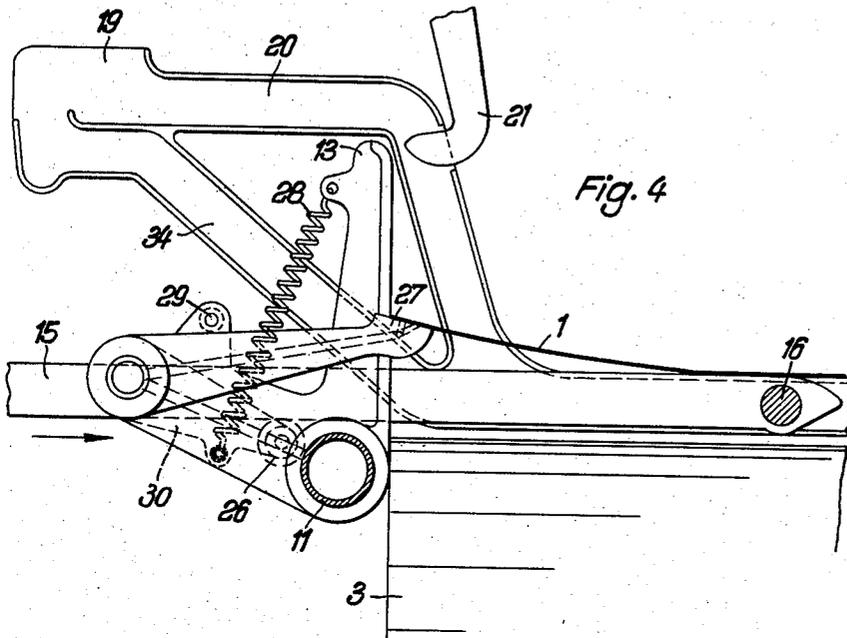


Fig. 4

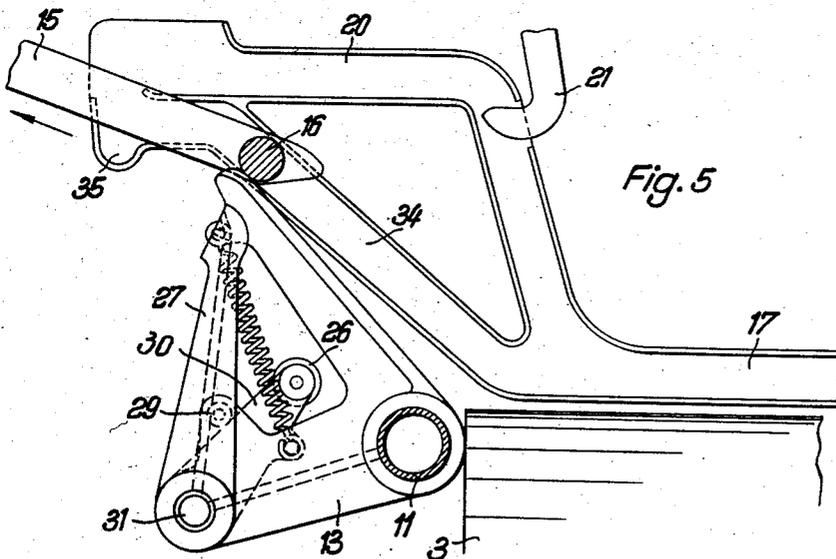


Fig. 5

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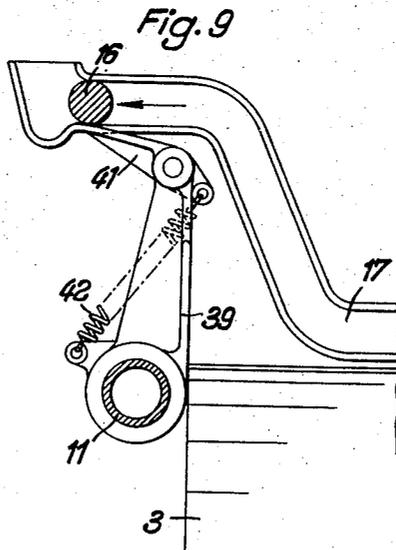
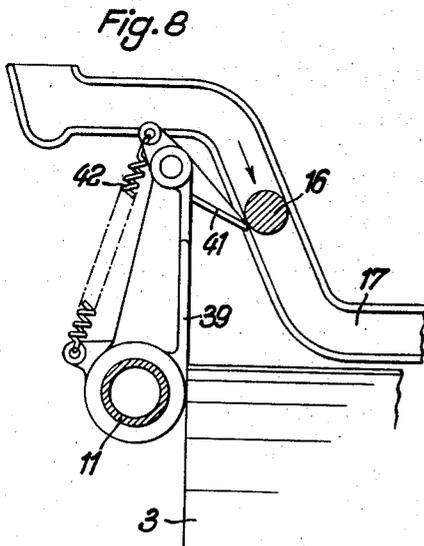
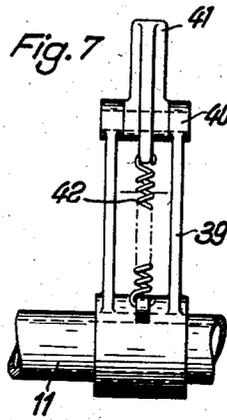
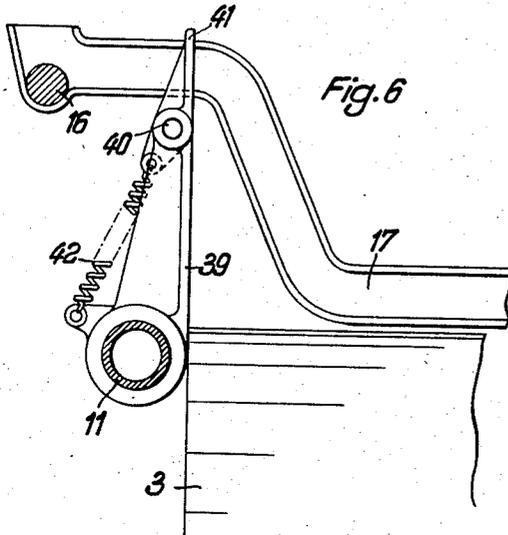
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2,847,215

STACKING DEVICE FOR PRINTING MACHINES

Filed Dec. 9, 1954

4 Sheets-Sheet 4



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STACKING DEVICE FOR PRINTING MACHINES

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Application December 9, 1954, Serial No. 474,262

Claims priority, application Germany December 28, 1953

10 Claims. (Cl. 271-88)

This invention relates to a stacking device for sheet printing machines by means of which the printed sheets are deposited on a stacking table during the operation of the machine.

In devices of this kind it frequently is the practice, when exchanging a full stacking table for a new one, to deposit the sheets which are being delivered in this interval onto an auxiliary support which is withdrawn again when the new stacking table has been brought into place. These auxiliary supports may consist of a thin board or of a grate formed of a plurality of longitudinal slats which are joined to each other at one or both of their ends by means of a cross bar. It is to this type of auxiliary support that the invention bears particular reference, and for that reason the said auxiliary support will hereinafter be referred to as "grate." It is to be understood, however, that the term grate also includes other forms of supports such as boards, table tops, rakes, and the like.

It is old to push these grates, or other supports, over the upper sheets on the stacking table in horizontally disposed guides. Especially in connection with high speed printing machines the introduction of the grate is very difficult as it must be completed in the short period between the delivery of two successively arriving sheets. It depends, in each case, on the alertness of the operator to catch the correct moment as otherwise the last sheet, which had not been able to settle down on the stack, will be caught and crumpled by the advancing grate. This is particularly the case with thin sheets of paper which require a comparatively long time to settle into their ultimate position on the stack.

It is, therefore, the main object of the invention to avoid the aforesaid disadvantages by moving the grate so that its leading front edge, or its front cross bar respectively, will contact with the sheet which has last been delivered and which may, by then, not have settled down properly. In this way the said last sheet will be pressed down onto the stack so that it cannot become crumpled by the then beginning advance of the grate.

In accordance with the invention this is achieved by guiding the grate at the beginning of its movement with its leading edge in a direction toward the upper surface of the stack at the near end thereof, and for this reason it is another object of the invention to provide efficient means by which such movement will be rendered possible. These means may consist of appropriate guides in which the grate is moved first in a substantially vertical direction against the top surface of the stack and thereafter in a path substantially parallel to the said surface.

It has been found of advantage to so arrange the guide, or guides, that the grate in the beginning of its movement is caused to advance in a track which is positioned somewhat above the stops which are usually provided for the alignment of the front edges of the printed sheets, because it will then not be necessary to move these stops out of the way of the front bar of the grate. For the subsequent removal of the grate from the stack it is, however, more convenient to move the front bar of the grate in a

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track within the working region of the front stops in order to avoid the necessity of having to lift the newly gathered stack upon the grate to a height above the front stops. It is, therefore, a further object of the invention to provide means, preferably in conjunction with the aforesaid guides, which will enable the withdrawal of the grate from underneath the newly formed stack by the said cross bar taking a different way on its return than during its advance. In a preferred form of the invention a preferably fixed switch may be provided at the near end of the guide track, through which the front cross bar of the grate in its advancing movement is directed through the one substantially vertical branch, and in its return movement through another, moderately inclined branch of the track.

A still further object of the invention consists in the provision of means which will enable the front stops for the alignment of the sheets to move out of the way of the front cross bar of the grate when the latter is introduced into or removed from the stack, and to automatically resume their initial position as soon as the said cross bar has passed.

This arrangement has the advantage that in both directions of its travel the front cross bar of the grate is able to move, within the working region of the said stops, at a comparatively low height above the surface of the stack. A further advantage rests in that the same guide can be used for advancing as well as for returning and withdrawing the grate from the stack. If in the case of a machine for the printing of large sheets a greater number of front stops is required, it would in most cases be sufficient to arrange two front stops over the width of the smallest sheet in the aforesaid manner, while all other front stops could be maintained at a height in which they do not project into the path of the cross bar.

Still another object of the invention rests in the provision of special retarding means which operate in the sequence of the sheet delivery and which serve the purpose of permitting the introduction of a grate only during a predetermined part of the working cycle of the machine. It is advisable to place the retarding means at the beginning of that branch of the guide track which leads the grate in the direction of the stack surface so that the cross bar will lower itself by its own weight onto the surface of the stack. The release of the said retarding means is effected, in accordance with the invention, at the moment in which the next approaching sheet has nearly reached the front stops in order to afford as much time as possible for the said last sheet to settle down and align itself properly on the stack.

Yet another object of the invention consists in the provision of means which come into action by the movement of the grate in the direction of the stack surface to hold the front edge of the next approaching sheet in a position to be deposited. Thereby the said sheet, and all subsequent sheets, are prevented from becoming dislodged from their correct position by the subsequent movement of the grate over the stack surface.

From the statements above it will be gathered that a major advantage of the invention consists in the fact that the introduction of the grate parallel to the stack surface can be satisfactorily carried out by the operator at his leisure and always at a moment, in which the sheet which has last been deposited on the main stack and pressed down to it with its front edge, has taken a perfectly flat position on the stack, so that no crumpling or other destruction of the sheet can take place.

The invention further provides that the means for holding the front edges of the sheets may be rendered ineffective either at the end of the introductory movement or during the withdrawal of the grate as desired.

The accompanying sheets of drawings illustrate a pre-

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ferred way of carrying out the invention and a modification thereof by way of example. In these drawings:

Fig. 1 is a front view of the stacking device of a sheet printing machine in accordance with the invention.

Fig. 2 represents a partial longitudinal section through the left hand side of Fig. 1 on a larger scale.

Fig. 3 shows a front stop and suction device for the stacked sheets and is a front elevation of Fig. 4 as seen in the direction of the arrow.

Fig. 4 illustrates a part of the device shown in Fig. 2 with the grate being positioned over the stack.

Fig. 5 is a view similar to Fig. 4 with the grate in its withdrawn position.

Fig. 6 is a view similar to Fig. 4 of a modified form of the invention.

Fig. 7 illustrates a front elevation of Fig. 6.

Fig. 8 is a view similar to Fig. 6 in which the cross bar of a grate is being moved into operative position.

Fig. 9 is a view similar to Fig. 8 with the cross bar being moved out of operation.

The embodiment of the invention as illustrated in Figs. 1 to 5 of the drawings illustrates the stacking device of a sheet printing machine comprising a delivery chain by means of which the printed sheets 1 are carried by grippers 2 over the delivery stack 3 to be deposited thereon. The gripper systems 4, of which only one is shown in Fig. 2, are suspended in known manner on chains 5 which are adapted to move over sprocket wheels 6 and 7. These sprocket wheels are journaled in the side walls 8 and 9 of the stacking device at the inside thereof. In Fig. 2 the pitch circle of the sprocket wheel 6 is denominated by the numeral 10.

Fixed upon the carrier tube 11 are the conventional front stops 12 and 13 for the alignment of the front edges of the sheets as they are being delivered by the grippers 2, 4. The carrier tube 11 is rockable in the side walls 8, 9 of the stacking device and is normally held by a spring (not shown) in contact with an abutment so that the front stops 12, 13 assume the position illustrated by the stops 13 in Figs. 2 and 4.

The auxiliary means for temporarily receiving the sheets during the exchange of the stacking tables are provided in the shape of a grate comprising individual longitudinal slats 14, 15 which are connected at their front ends by means of a cross bar 16 and may be connected at their rear ends by a similar cross bar which, however, is not visible in the drawings. In order to facilitate the movement of the grate over the stack, guide tracks in the form of U-channels are fixed to the side walls 8, 9 in which the ends of the cross bar are adapted to move.

In its position of rest the grate 14, 15 is preferably suspended with its front bar 16 in a shallow depression at the front of the device as is indicated in Fig. 6. When the grate is to be shifted inwardly over the stack 3 which has been piled up on the main stacking table 3a (Fig. 2) it is first moved along a horizontal branch 20 of the guide channels 17, 18 into the position shown in Fig. 2. It will be noted that the branch 20 is positioned above the front stops 12, 13, which are thus able to remain in their operating position and to ensure the correct alignment of the delivered sheets also during the introduction of the grate into the stacking device. In the position shown in Fig. 2 the cross bar 16 is prevented from further movement by being held in the hooked end of a cam-controlled retention lever 21, of which one each is provided at either side of the device and pivoted on bolts 22 to the side walls 8 and 9. Each of the retention levers 21 is provided at its other end with a follower 23 adapted to be pressed against a cam 25 by means of a spring 24. The cam 25 is connected to and rotated with the sprocket wheel 6, or 7 respectively, the diameters of which are such as to cause them to make a complete revolution each in conformity with the sequence of the sheets arriving at the stacking device.

Once in every rotation of the sprocket wheels in the

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direction of the arrow in Fig. 2 the cams 25 lift the followers 23 against the action of the springs 24, whereby the cross bar 16 becomes released so that the grate is able to descend by gravity down the steeply inclined branch 17a of the guide channels 17, 18 with its leading edge in the direction of the top surface of the stack 3. Hereby the last sheet, or sheets, on the stack are pressed down onto the latter and in this way are saved from getting crumpled by the now following sliding-in movement of the grate. The release of the cross bar 16 by the retention lever 21 takes place directly before the next sheet 1 approaches its stacking position as can be gathered from Fig. 2.

During the descent in the afore-described manner of the grate in the direction of the stack 3 the slats 15 of the grate come into contact with the rollers 26 (Figs. 3 and 4) and thereby cause the suction nozzles 27, which are pivoted to the front stops 13, to move into the position shown in Fig. 4 against the action of their springs 28. By these suction nozzles the front edge of the sheet next delivered will be held in a position above the grate whereby the said sheet is ensured against any damage during the subsequent complete introduction of the grate into the stacking device.

The end position of the nozzle 27 according to Figs. 2 and 5 is determined by a stop 29 against which the lever 30, which carries the roller 26, is drawn under the action of spring 23.

The levers 30 and their suction nozzles 27 are joined by hollow pins 31 through which they communicate in turn with the carrier tube 11 by means of a bore 32 each. The said carrier tube is provided with a socket 33 outside the wall 8 (Fig. 1) to which a vacuum producer of any known or convenient kind may be connected.

After the exchange of the stacks the grate is withdrawn from the stacking device, whereby the front cross bar 16 passes into the lower branches 34 (Fig. 5) of the guide tracks 17, 18. As already stated, the carrier tube 11 together with the stops 12, 13 is placed under the influence of a spring so that, with the withdrawal of the grate from the stacking device, its front cross bar 16 turns the stops 13 into the position shown in Fig. 5. Then, after the cross bar has passed beyond the stops 13, the latter are able automatically to resume their initial position.

A shallow depression 35 is arranged at the upper end of the branch 34, in which the front bar 16 of the grate can be placed when not used. There is, further, provided a control valve 36 (Fig. 2) which is provided with sockets 37, 38 by means of which it is connected into the conduit between a vacuum pump and the pipe socket 33 already referred to. This valve 36 serves the purpose of opening and closing the communication between the vacuum pump and the suction nozzles 27, whereby the sheet 1 will be attracted or released. The valve is provided with a lever 36a which projects into the track 17 or 18, so that it is opened and closed automatically by the cross bar 16 coming into contact with it during the passage of the grate along the guide tracks 17, 18 as will easily be seen from Fig. 2.

Figs. 6 to 9 illustrate a more simplified form of the invention in a substantially diagrammatic manner. In this modification the front cross bar 16 of the grate moves in both directions into a branch of the track 17, and 18 respectively, which is within the working region of the front stops 39. This arrangement has the advantage of being considerably simpler in construction and of not requiring any holding means for the front edges of the sheets nor of any locking means such as the lever 21 in the example first referred to. Each of the front stops, in this case, consists of a lower member 39 and a pawl-like upper member 41 which is pivoted thereto by a hinge pin 40. A spring 42 is provided which normally holds the upper part 41 in its upright position as shown in Fig. 6. When the grate is moved from the position of the bar 16 in

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Fig. 6 into its position over the stack 3, the upper parts 41 are pivoted against the action of their springs 42 into the position of Fig. 8. On its return movement the grate with its cross bar 16, turns the pawl-like upper parts 41 from the position of Fig. 6 into that shown in Fig. 9 while the position of the main part 39 of the front stops does not change so that the stacking of the sheets may continue.

What I claim is:

1. In a sheet stacking device comprising an exchangeable main stacking table and in which the sheets which are delivered during the exchange of the said main stacking table are preliminarily deposited on an auxiliary stacking table above a stack on the main table, a grate to serve as the auxiliary stacking table, a front cross bar on said grate, a horizontal main track for guiding the said front cross bar in a substantially parallel path over the stack on the said main stacking table, a steeply inclined branch at one end of the said main track for guiding the said front cross bar at the beginning of its movement at a steep inclination toward the top surface of said stack on the main stacking table, and a lesser inclined branch adjacent said steeply inclined branch for guiding said cross bar and grate on their return movement away from the said stack.

2. In a stacking device for sheet printing machines having a main stacking table and an auxiliary stacking table onto which the sheets are delivered during the exchange of the main stacking table, a stack on said main stacking table, a front cross bar on said auxiliary table at an elevated position of rest in relation to said main stack, guide means for guiding the front cross bar in a path first downwardly in the direction first toward the top surface of and then parallel to said main stack, a control cam, means to rotate said control cam in the sequence of the sheet delivery, a cam lever operable by said control cam, and a retarding hook on said cam lever for stopping and releasing the front cross-bar of the auxiliary stacking table for its movement in the direction of said main stack.

3. In a stacking device for sheet printing machines as set forth in claim 2, said control cam having a rise in such a position as to permit of the movement of the auxiliary stacking table from its elevated position of rest downwardly and over the top surface of the stack on the main stacking table only at the beginning of the working cycle of the stacking device.

4. In a stacking device for sheet printing machines comprising a main stacking table and an auxiliary stacking table including a grate at an elevated position of rest in relation to the main stacking table, a guide track for guiding said auxiliary stacking table from said elevated position of rest first in the direction of and then over the surface of the stack on the said main stacking table, and means for holding the leading edge of the sheet which is being delivered after the commencing inward movement of the auxiliary stacking table in a position above the said grate.

5. In a stacking device for sheet printing machines comprising a main stacking table and an auxiliary stacking table, a guide track for guiding said auxiliary stacking table first toward and then over the surface of a stack on the said main stacking table, an air nozzle for holding the leading edge of the sheet which is being delivered after the commencing inward movement of the auxiliary stacking table has started, a suction air conduit, a turn cock in said conduit adjacent the guide track for

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the auxiliary table, and a turning on and off lever on said turn cock projecting into the said guide track to be opened and closed by contact with said auxiliary stacking table during its in and out movement in the said track.

6. In a stacking device for sheet printing machines as set forth in claim 4, the provision of means for controlling the action of the sheet edge holding means so that it ceases its action approximately at the withdrawal of the auxiliary stacking table from the stack.

7. In a printing machine, a sheet stacking device having an exchangeable main stacking table and an auxiliary stacking table upon which the printed sheets are received during the exchange of the said main stacking table, comprising, guide means for guiding the leading edge of the said auxiliary stacking table during its movement over a stack of sheets on said main stacking table first at a steep inclination in the direction of the said stack and subsequently in a direction over and substantially parallel to the said stack on the said main stacking table.

8. In a printing machine, a sheet stacking device having an exchangeable main stacking table, a stack of sheets on said table, and a slidable auxiliary stacking table having a front cross bar upon which auxiliary table the printed sheets from the machine are received during the exchange of the main stacking table, comprising, a guide track for the said front cross bar of said auxiliary stacking table having two branches of mutually inclined position, one of said branches being of a steep inclination to the horizontal and serving to guide said front cross bar of said auxiliary stacking table first in a direction at approximately right angles to the stack on said main stacking table, and said other branch extending approximately horizontal and serving to guide said front cross bar in a direction over and substantially parallel to the said stack prior to the exchange of the main stacking table.

9. In a sheet printing machine having front stops and a sheet stacking device comprising an exchangeable main stacking table and an auxiliary stacking table upon which the sheets which are delivered during the exchange of the main stacking table are preliminarily deposited, a stack on said main table, said auxiliary stacking table comprising a grate consisting of a plurality of longitudinal grate bars, a front cross bar interconnecting the said grate bars at their front ends, a track for guiding the said grate into an elevated position over the stack on said main stacking table, and a branch in the said track for guiding the said front cross bar in a path first horizontally above the said front stops and then downwardly in the direction of the main stack when the grate starts its inward travel in the direction of and substantially parallel to the said stack.

10. In a sheet printing machine having front stops and a sheet stacking device as set forth in claim 9, the said front stops projecting into the said track and having resilient means permitting said front stops deviating in either direction when impacted upon by the front cross bar of the grate on its travel toward or away from the said stack.

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