Aug. 20, 1935. A. WORMSER 2,011,745

METHOD OF AND MEANS FOR FEEDING SHEET MATERIAL

Filed March 14, 1935

Fig. 1

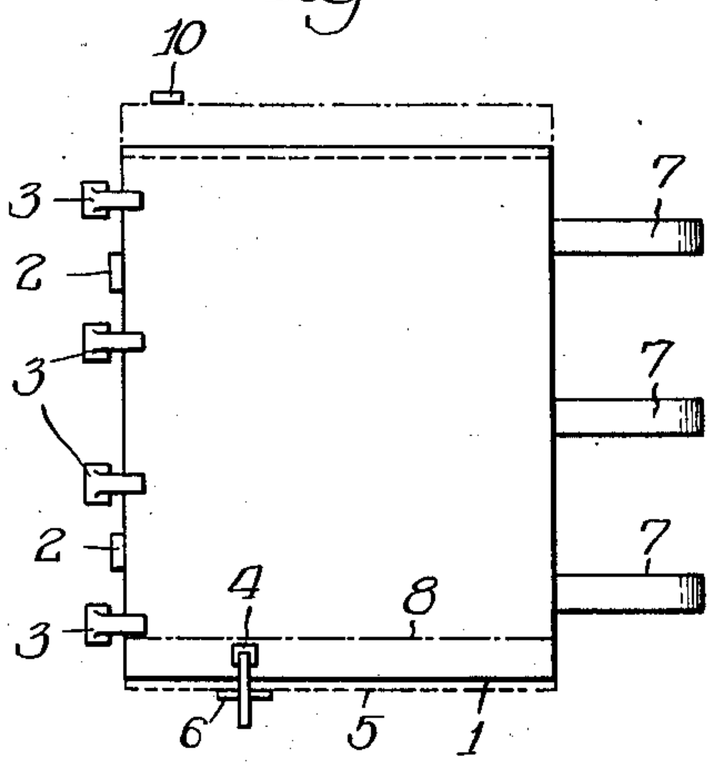


Fig. 4

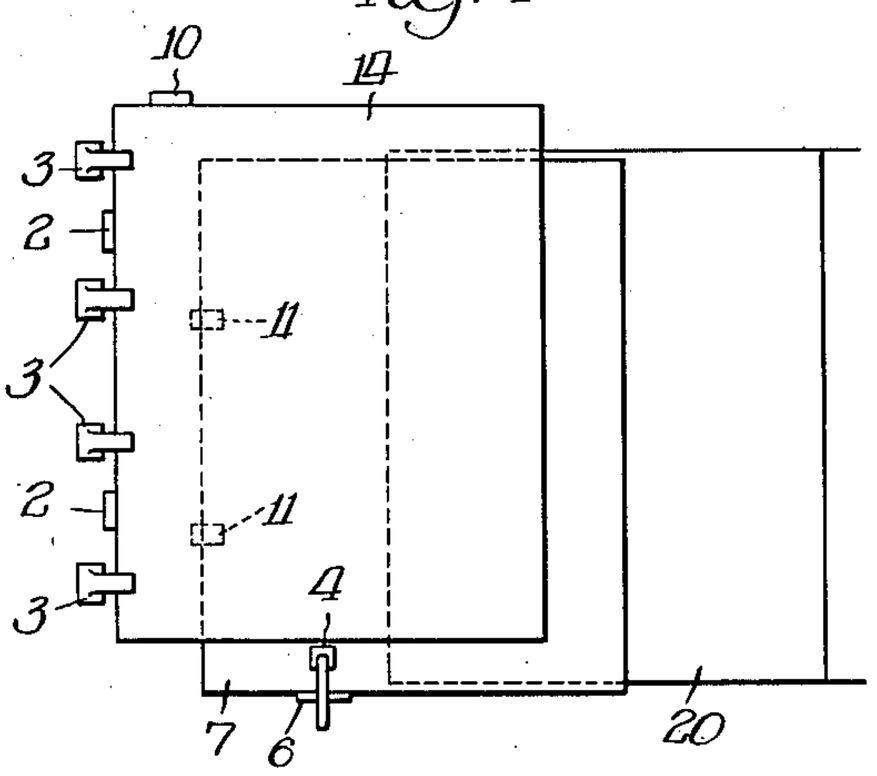


Fig. 2

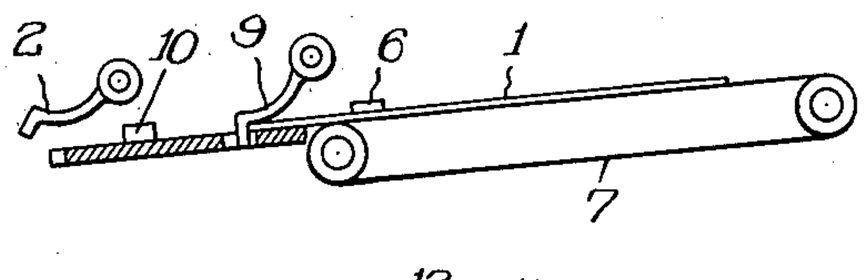


Fig. 3

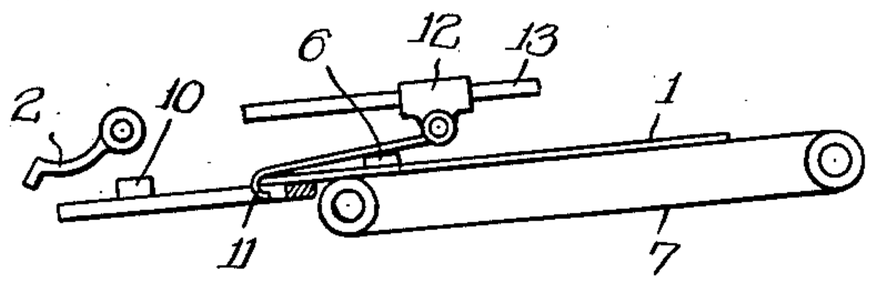
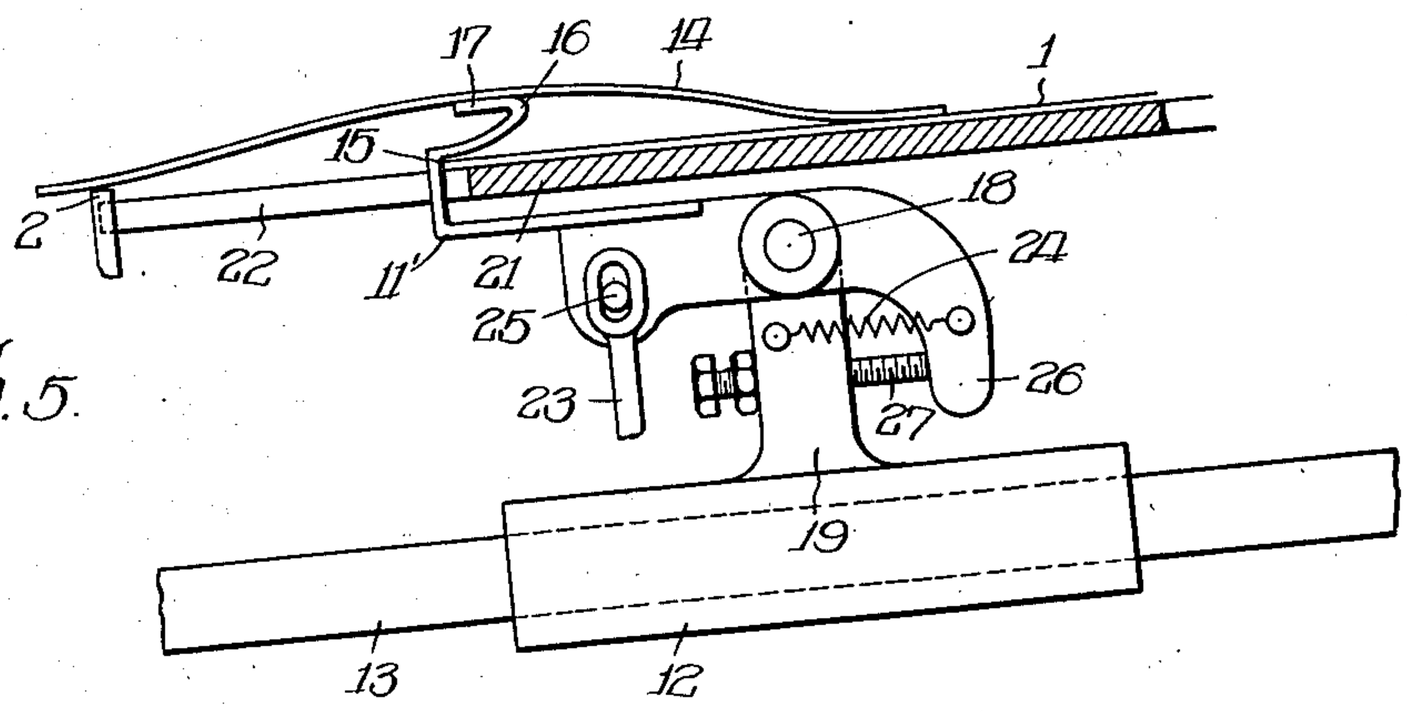


Fig. 5.



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METHOD OF AND MEANS FOR FEEDING SHEET MATERIAL

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14 Claims. (Cl. 271—48)

The invention relates to a method of and means for feeding sheet material to a machine. The essential feature of this device is that each sheet is preliminarily aligned sideways before it is definitely aligned. This preliminary side alignment takes place either while the sheet is in contact with the front gauges, or before it reaches same, in which latter case special front gauges can be provided at some distance from the final front gauges, which special gauges can be moved forward so as to bring the preliminary aligned sheet to the final front gauges for definite alignment.

On the accompanying drawing the invention is illustrated by way of example, Figs. 1 to 4 showing different constructions, while Fig. 5 shows a more detailed representation of the construction according to Fig. 4. Figs. 1 and 4 are plan views, and Figs. 2, 3 and 5 side elevations.

In Fig. 1 the sheet 1 is drawn in full lines in the position it occupies after it has just been moved to the front gauges 2 by a transport device. The grippers 3 should first be regarded as open. A normal side pulling gauge engages the sheet, with its jaw-part 4, and pulls it into the dotted position 5, in which it touches the stationary side gauge 6. Because, at the same time, the tapes 7 have the tendency to push the sheet forward, it will be pressed against the front gauges 2 again, as soon as the side gauge 4 opens, so that the front gauges always align the sheet at the same places of its edge. At this stage the grippers 3 close and the sheet is definitely aligned sideways and thus comes into the position 8. Although during this operation the grippers 3 and the counter surfaces cooperating with these grippers, and, if desired, also the front gauges 2 are also moved sideways, they are not shown in the new position, in order not to make the drawing confusing. The moving of the front gauges through exactly the same distance as the sheet is moved sideways, during the definite alignment, has the purpose to assure that the completely aligned sheet will always contact with the definitely aligning organs at the same point.

The operation with the construction shown in Fig. 2 differs from that shown in Fig. 1 by the fact that the preliminary alignment does not take place in contact with the final front gauges 2, but while pushing against the special front gauges 9.

The sheet 1 is pressed first against the preliminarily aligning gauges 9, then pulled against the side gauge 6, and, after the front gauges 9 rise, it is pressed by the tapes 7, while in laterally aligned position, against the final front gauges 2. It contacts with these gauges 9 and 2 with the same parts of its front edge, allowing for quite small differences. The final alignment sideways is effected by the gauge 10.

It is important that the sheet, after being preliminarily aligned, reaches its final alignment without substantial differences. That is assured, in the first place, when the final front gauges 2 are used during the preliminary side alignment, as in the first construction described above. If, as in the second example, there is only a short distance between the point of preliminary alignment and the point of final alignment, tapes will suffice to fulfil the condition mentioned. More reliable, however, is the device shown in Fig. 3.

Here hooks 11 are used as front gauges during the preliminary side alignment. These hooks are pivoted to slides 12 which are guided parallel to the feed-table by rods 13. After the preliminary alignment has been effected longitudinally and transversely, the hooks 11 move forward, preferably with much reduced speed, and thus bring the sheet 1 to the front marks 2 for the final alignment in both directions. During this alignment the tapes 7 constantly push the sheet against the hooks 11.

A special construction is required when the preliminary alignment is effected while the sheet is partly overlapped. The operation of such a device is shown diagrammatically in Fig. 4, and the construction is illustrated in Fig. 5.

The sheet 1 to be preliminarily aligned, which is partly overlapped by the previous sheet, is shown in the position it assumes after it has contacted with the surface 15 serving as front gauge for the preliminary alignment. The next following operation is the same as that described above. The sheet 1 is first preliminarily aligned sideways by the device, 4, 6. Thereafter the hooks move forward, and the sheet 1 is at the same time continuously pressed against the surface 15 by the tapes 7 or by the following sheets 20. In this way the sheet 1 reaches the main front gauges 2 where it will be definitely aligned sideways before it passes on to the machine.

In Fig. 5 the hooks 11' are shown in the position in which they engage the sheet 1 and align the same by contact with its front edge. It will be seen from this figure that the hooks have not only a sheet aligning surface 15, but also a point 16 which assures that sheets arriving in a wavy condition are safely led to the surface 15. From the point 16 a supporting surface 17 extends which enables the overlapping sheet to be raised without injury to it.

The hooks are pivoted at 18 in a standard 19 on the slide 12 which is guided parallel to the feed-table 21 by the guide 13. After the sheet 1 has been caught, the hooks 11 move forward on their guide 13 and in the slots 22 of the feed table 21 preferably with a much reduced speed, until the sheet 1 touches the front gauges 2. The hooks then move forward so that the points 16 can be moved around the front edge of the sheet. By a short movement, the connecting rod 23 tilts the hooks down about the pivot 18, so that the sheet 1, after it has been finally aligned, can be pulled over same. The hooks are now pulled back along their guide 13 and they are then raised under the influence of the spring 24, the connecting rod 23 rising at the same time, so that finally it arrives in the position shown in Fig. 5.

The hole by which the connecting rod surrounds the pin 25 is elongated, so that the hooks 11, in raised position, can turn to the right, independent of the rod 23, until the arm 26 is stopped by the adjustable screw 27. By this arrangement it is possible to adjust the height of the points 16 over the feed table 21 in accordance with the thickness of the paper.

In moving back, the hooks 11 can describe a curve upwards, so that they raise the overlapping sheet at a point further forward or backward, according to requirement. They can also be moved in a stepped line.

Even when the preliminary alignment itself does not take place while the sheet is overlapped, that is to say when the sheet to be preliminarily aligned reaches the hooks only after the previous sheet has entirely left it, still it can be desirable for the hooks 11 to be carried out and moved in the manner described, because time is saved when the hooks rise in overlapped condition, so that they will be in the position to receive the sheet to be preliminarily aligned, or nearly so, at the moment when they are uncovered.

Instead of the supporting extensions 17, rollers or balls may be provided.

The hooks 11 can be provided with sheet supporting surfaces underneath the points 16, so that the front edge of the sheet is not guided by the staggered surfaces of the feed table and points, but between two surfaces arranged one over the other, and is thus prevented from being creased. Preferably such a supporting surface should be adjustable relative to the adjacent point, in order to be adapted to different paper thicknesses. On the other hand the supporting surface can be fastened to the body of the hook, and the point can be made adjustable, in which case it will be easier to assure that the supporting surface is always at the same height as the feed table, and the distance of the point from the supporting surface can be altered according to the paper thickness.

In the case of sheets fed in overlapping condition, it may be advisable, under some circumstances, to preliminarily align the back edge of the sheet, which, as shown by Fig. 4, is not overlapped. The preliminary side alignment should then be preferably provided at some point near the back edge of the sheet.

Preferably the front gauges 9, or the hooks 11 should not be longitudinally in a line with the main front gauges 2, because, in that case, the harder knock of the sheets against the preliminary front gauges 9, 11 meets the edge of the sheet at a different point from that at which the final front alignment is effected at a slower speed. Further, the side gauge 6 should preferably contact with the sheet at a different point from that at which the final side gauge 10 acts.

The front gauges 9 or the hooks 11 can be stationary during the preliminary alignment, so that the pull gauge 4, 6 can be fixed and only the sheet width need be correspondingly adjustable. As however only a preliminary alignment is to be effected, and this is possible with sufficient accuracy while the sheet is moving, the front gauges which serve, at the same time, as sheet catching hooks, can continue the motion which they have mostly in catching the sheet, in which case the side pulling gauge either moves as well, or it can be so arranged as to permit the motion of the sheet.

If the sheet, after being preliminarily aligned, has to pass through a greater distance, differences which might occur during the motion to the final aligning organs should be prevented by using grippers, suction, or some other device by which the sheet can be positively held.

The hooks 11 can also he used without the preliminary side gauges.

What I claim and desire to secure by Letters Patent of the United States is:

1. The combination with a device for feeding sheet material to a machine, of front gauges, hooks adapted to be lifted from below into the path of each sheet before it reaches said front gauges and thereby to lift an overlapping sheet passing to the machine, means to move said hooks to and fro, and means to lower said hooks at the end of its front stroke and to raise said hooks on the return stroke, substantially as described.

2. A front gauge to preliminarily align a sheet in a device for feeding sheets to a machine, comprising a sheet arresting portion 15, a point 16 to guide the front edge of the sheet previous to arresting same, and an extension 17 to lift an overlapping sheet.

3. The method of feeding sheet material to a machine, comprising, advancing sheets over a support, bringing the front edge of a sheet in contact with preliminary front registering means to align it, moving said aligned sheet against side registering means while in contact with said preliminary front registering means, and imparting final front register to said sheet by moving it together with said preliminary front registering means until it contacts with final front registering means.

4. The method of feeding sheet material to a machine, comprising, advancing sheets over a support, bringing the front edge of a sheet in contact with preliminary front registering means to align it, moving said aligned sheet against side registering means while in contact with said preliminary front registering means, imparting final front register to said sheet by moving it together with said preliminary front registering means until it contacts with final front registering means, and moving said sheet laterally together with said front registering means to impart definite side register to said sheet.

5. The method of feeding sheet material to a machine, comprising, advancing sheets over a support, bringing the front edge of a sheet in contact with preliminary front registering means to align it, moving said aligned sheet against side registering means while in contact with said preliminary front registering means, imparting final front register to said sheet by moving it together with said preliminary front registering means until it contacts with final front registering means, removing the registered sheet, and raising

said sheet during its removal above the plane of oncoming sheets.

6. The method of feeding sheet material to a machine, comprising, advancing sheets over a support, bringing the front edge of a sheet in contact with preliminary front registering means to align it, moving said aligned sheet against side registering means while in contact with said preliminary front registering means, imparting final front register to said sheet by moving it together with said preliminary front registering means until it contacts with final front registering means, moving said sheet laterally together with said front registering means to impart definite side register to said sheet, removing the registered sheet, and raising said sheet during its removal above the plane of oncoming sheets.

7. The method of feeding a bank of seriated sheets of material to a machine, comprising, advancing sheets over a support, bringing the leading edge of a superimposed sheet in contact with preliminary front registering means to align it, moving said aligned sheet against side registering means while in contact with said preliminary front registering means, imparting final front register to said sheet by moving it together with said preliminary front registering means until it contacts with final front registering means, and imparting preliminary side register to an underlaying sheet while still covered in part by said superimposed sheet.

8. The method of feeding a bank of seriated sheets of material to a machine, comprising, advancing sheets over a support, bringing the leading edge of a superimposed sheet in contact with preliminary front registering means to align it, moving said aligned sheet against side registering means while in contact with said preliminary front registering means, imparting final front register to said sheet by moving it together with said preliminary front registering means until it contacts with final front registering means, imparting preliminary side register to an underlaying sheet while still covered in part by said superimposed sheet, and moving said latter sheet together with said front registering means so that the margin of an underlaying sheet will be exposed sufficiently for the preliminary side registering means to engage it.

9. A method of registering sheets, comprising, advancing sheets towards registering means, imparting preliminary front and side register to a sheet, slowing down a sheet during its travel from the preliminary front registering position to its final front registering position, and moving a sheet laterally for final side register while in engagement with the final front registering means and after having received its preliminary side registering movement.

10. Sheet registering mechanism, having in combination sheet supporting means, preliminary front and side registering means, final front and side registering means, said preliminary front registering means being adapted to slow down an oncoming sheet and during its travel from the preliminary front registering position to said final front registering position and raise a registered sheet out of the path of an oncoming succeeding sheet, and means adapted for moving a sheet laterally away from said preliminary side registering means for final front and side register and while in engagement with said final front registering means.

11. Sheet registering mechanism, having in combination sheet supporting means, preliminary front and side registering means, final front and side registering means, said preliminary front registering means being adapted to slow down a sheet and including a sheet engaging member having means to extend over an oncoming sheet and to support its leading edge, said member being adapted to impart preliminary front register to an oncoming sheet and slow it down during its travel from the preliminary front registering position to said final front registering means and raise a preceding registered sheet out of the path of an oncoming sheet.

12. Sheet registering mechanism, having in combination sheet supporting means, preliminary front and side registering means, final front and side registering means, said preliminary front registering means being adapted to slow down a sheet and including an adjustable sheet-engaging member having means to extend over an oncoming sheet and to support its leading edge, said member being adapted to impart preliminary front register to an oncoming sheet and slow it down during its travel from the preliminary front registering position to said final front registering means and raise a preceding registered sheet out of the path of an oncoming succeeding sheet.

13. Sheet registering mechanism, having in combination means to support a continuous bank of seriated sheets, front registering means, preliminary and final side registering means, and a sheet slow-down member adapted to impart preliminary front register to an oncoming sheet and slow it down during its travel to said front registering means, said member being provided with means for supporting a preceding sheet and raising it out of the path of an oncoming sheet.

14. Sheet registering mechanism, having in combination means to support a continuous bank of seriated sheets, front registering means, preliminary and final side registering means, and an adjustable sheet slow-down member adapted to impart preliminary front register to an oncoming sheet and slow it down during its travel to said front registering means, said member being provided with means for supporting a preceding sheet and raising it out of the path of an oncoming sheet.

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