

Nov. 12, 1940.

D. P. SANFORD

2,221,153

SHEET FEEDER

Filed May 5, 1939

2 Sheets-Sheet 1

Fig. 1

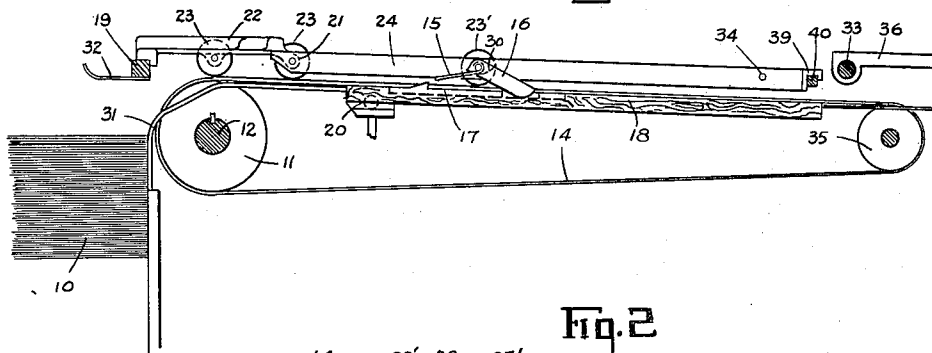


Fig. 2

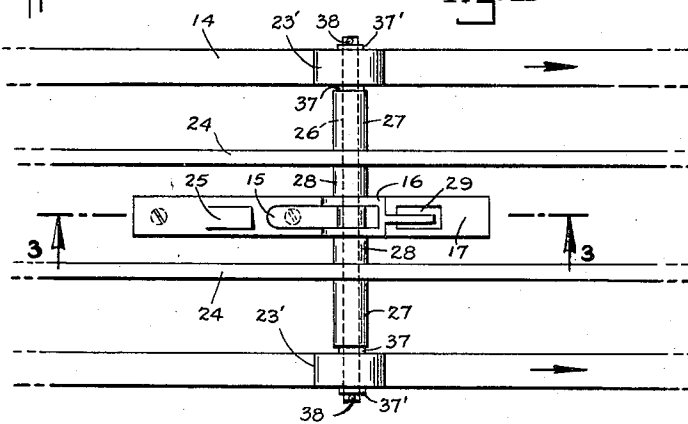
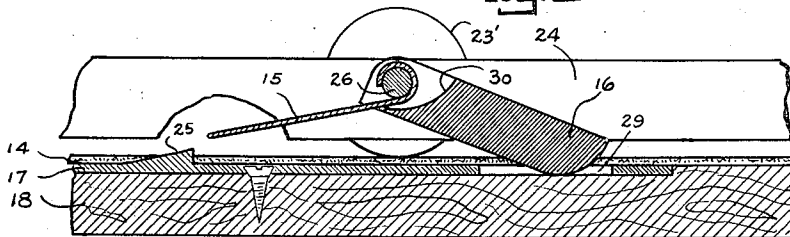


Fig. 3



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2 Sheets-Sheet 2

Fig. 4

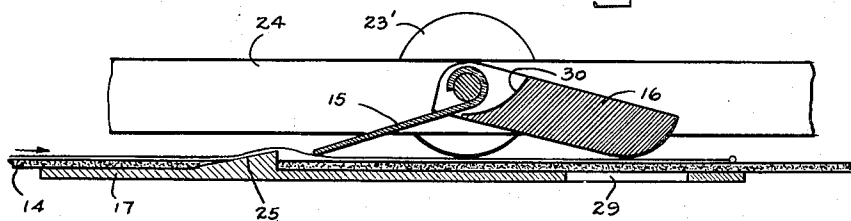


Fig. 5

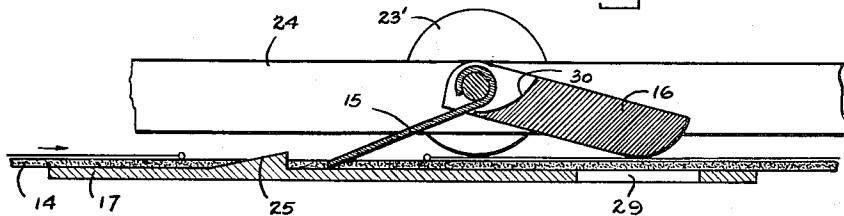
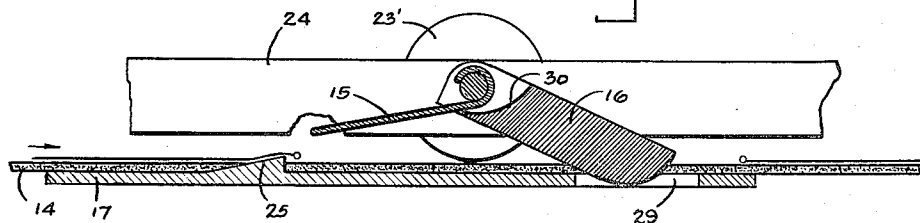


Fig. 6



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2,221,153

SHEET FEEDER

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Application May 5, 1939, Serial No. 271,822

8 Claims. (Cl. 271-46)

This invention relates to improvements in sheet feeders and refers particularly to sheet feeders for printing presses.

There are some functions pertinent to sheet feeding which are relatively non-positive. The reason for this is that in dealing with paper or like material which is generally of a fragile nature, and which may vary considerably in size, texture, or condition, many operation variables arise which must be overcome by operation of light forces such as air blast and suction. Such light forces occasionally fail to function.

Results of such failure are that the feeder feeds out of time or may entirely miss taking a sheet in its cycle. It then becomes a problem to prevent further resulting interference or damage which might take place as feeding continues.

When feeding sheets partially lapped it has been found that for certain sheet sizes and for given feeding conditions wherein the sheet is picked up, transported to guides by a continuous conveyor, and held substantially stationary at guides during a registering period, the sheet fed next following a feeder "miss" does not lap the sheet fed immediately prior to the "miss." Rather, a gap is left between these sheets, and as the feeding operation continues, the leading edge of the sheet behind the gap catches up to and collides with the trailing edge of a sheet which has been stopped by and is held substantially stationary at guides.

The result of such a collision is that the sheet at the guides may be badly wrinkled and, as it proceeds through subsequent operations, it is liable to cause "batter" on a printing form or otherwise affect equipment because of its crumpled condition.

With the above in mind it is an object of this invention to provide a baffle which will prevent sheets which are being transported on a conveyor from interfering with a previously fed sheet.

A further object of the invention is to provide a baffle which will be automatically operative when conditions are such that interference would take place and inoperative when no interference could take place.

Other objects of the invention are to provide a baffle which is composed of simple and effective instrumentalities which are not expensive to produce, which will operate on any normal range of sheets and which require little or no adjusting or servicing.

With these and other objects in view which will be apparent throughout the description, the

invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the invention may be made as come within the scope of the claims.

The accompanying drawings illustrate an example of physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a longitudinal section view through a portion of a sheet feeder for printing machinery illustrating the application of the invention thereto;

Figure 2 is an enlarged top plan view of baffle mechanism applied above the feedboard;

Figure 3 is a longitudinal section taken on the line 3-3 in Figure 2; and

Figures 4, 5, and 6 are similar views to Figure 3 showing stages of operation.

Referring now to the accompanying drawings in which like numerals indicate like parts throughout the several views, the numeral 10 designates a pile of sheets loaded on the platform of a sheet feeder and maintained in position by any suitable devices known in the art. Individual sheets are separated and fed in timed sequence from the top of the pile to a conveyor by suitable feed-off devices as for example the mechanism described in my co-pending application Serial Number 232,443. Sheets are guided by the top guide 32, and bottom guide 31 until their leading edges reach continuous conveyor belts 14 trained over and driven by pulleys 11 secured to the driving shaft 12 on one end of the conveyor, and idler pulleys 35 at the other end. Spaced drop rollers 23, loosely mounted for rotation in the brackets 22 fixed to a cross member 19 of the feeder frame, not shown, roll on conveyor belts 14 and serve to maintain sheets in frictional contact with the belts so that they will be carried down the feedboard 18 to two or more front guides 36 which hold the sheets substantially stationary against the frictional drive of the conveyor belts 14 for a predetermined register period. Guides 36 are then pivoted counterclockwise with shaft 33 by timed operating mechanism not shown to allow a sheet to pass on to subsequent operations. An example of such guide or gage operating mechanism is contained in U. S. Patent No. 1,452,466 issued to W. M. Kelly.

A framework, comprising two parallel rectan-

gular bars 24 spaced apart by the rivet studs 34 is pivoted at one end to the brackets 22 at centers 21 and extends therefrom above the length of the feedboard serving as a mounting for additional drop rollers or for other devices known to the art which may be used for the purpose of maintaining sheets in frictional contact with the conveyor belts. Brackets 39, rigidly mounted to the other end of bars 24, rest on the crossbar 40 extending over the feedboard 18 and mounted in any suitable manner at the sides of the feedboard.

One set of additional drop rollers 23' as shown in Figure 2 are loosely mounted for rotation on shaft 26 which is in turn mounted in and extends outwardly from bars 24 in aligned holes provided therefor. The rollers 23' are spaced away from bars 24 by collars 27 and anti-friction washers 37, and are maintained with slight axial freedom on the end of the shaft by similar anti-friction washers 37' held in place by pins 38. This arrangement allows rollers 23' to co-act with the conveyor belts 14 immediately therebelow to effect sheet driving.

A portion of the instrumentalities for checking the passage of sheets, as hereinafter described, are also mounted on shaft 26 in a position approximately central with the feedboard 18. A detector finger 16 of light weight construction is pivotally mounted on this shaft 26 and is spaced substantially midway between the bars 24 by the spacing collars 28. The yoke end of finger 16 is provided with aligned holes for loose mounting on the shaft 26 and the recess between the ears of this yoke is cut away to the surface 30, providing clearance and a contact edge to co-act with the baffle 15 fitted therebetween. Extending from this yoke end of the finger is a leaf portion which is rounded off in its lower extremity and smoothed to slidingly contact the surface of sheets without scratching or tearing in operation.

The baffle 15, of lighter weight construction than finger 16, fitted over shaft 26 within the recess of the detector finger 16 is also free to rock about this shaft independently of detector finger 16 until its flat under surface closely adjacent the pivot center strikes the line of contact on the detector finger 16 heretofore described. It will be perceived at this point that any clockwise rocking movement of the detector finger 16 will be transmitted to this baffle 15 through this line of contact. The free end of the baffle 15 is rounded and smooth to contact sheets traveling in a direction away from the supply pile to the discharge end of the conveyor. If desired, this end of baffle 15 may be slightly curved, depending upon conditions in feeding.

The plate 17 is located directly below baffle 15 and detector finger 16 and is rigidly mounted in the feedboard 18. This plate is flush on all edges with the board to prevent the leading edge of sheets which may be traversing the board from catching and wrinkling. A wedge-shaped raised portion 25 on the plate 17 located near the left end of the plate Figure 3, includes an edge which tapers upwardly in the direction of sheet travel to a point slightly above the plane of the conveyor belts 14. This surface serves to raise sheets which may be sagging in between the conveyor tapes to an elevation above the feedboard surface to be operated on by the baffle 15 as later described. On the opposite end of plate 17 is the rectangular cut-out portion 29 located to receive the rounded end of detector finger 16, the function of which will also be later described.

As indicated in Figure 3, the normal position of the detector finger 16, at a time when no sheets are being fed, is at an angle to the feed-board with its free end resting on the board in the cut-out portion 29 of plate 17 and at a distance from guides 36 slightly greater than the length of the longest sheet fed. Inasmuch as the finger 16 is heavier than and overbalances the baffle 15, the contact edge of surface 30 tends to hold the free end of baffle 15 off the plate 17 so that there is a difference in elevation between the lowest extremity of baffle 15 and the peak of the raised portion 25 of plate 17. This allows each sheet traversing the feedboard on the conveyor belts 14 toward the discharge end to slide up the inclined surface 25 and to pass between the upper corner of this raised portion 25 and the lowest tip of the baffle 15.

Upon moving further along the leading edge of a sheet contacts the detector finger 16 and, by means of the frictional drive of the conveyor belts, lifts the end of this finger until it can pass beneath it, as indicated in Figure 4. This, in turn, allows baffle 15 to pivot counterclockwise since the contact edge of surface 30 on the detector finger has moved away from contact with baffle 15.

As long as a sheet is passing beneath it, however, the baffle has no effect on the sheet other than to rest on its top surface as it passes therebeneath. In the event, however, that there is a gap in feeding, the finger 15 will drop to the plate 17 as shown in Figure 5, which action will obstruct the path of sheets being conveyed from the supply pile.

If, on the other hand, the gap in feeding is large enough so that no sheet reaches baffle 15 until after the trailing edge of a sheet fed before the gap has passed out from beneath the detector finger 16 as indicated in Figure 6, then finger 16 will again drop into the cut-out portion of plate 17, thereby overbalancing the baffle 15 and lifting it to a position which will allow sheets to pass by.

Inasmuch as the conveyor belts 14 move continuously it is apparent that if a sheet ahead is slowed or stopped such as by the front guides 36, a trailing sheet which does not partially lap the sheet ahead will continue to move and will collide with the sheet which has been stopped. If, however, the front guides raise up soon after the sheet is stopped, as in the case with printing machinery wherein a sheet comes to register and is then taken by the impression cylinder, then there is only a short interval of time per cycle during which interference could be expected. Otherwise the leading sheet is rapidly removed by the printing cylinder or other instrumentality and obviates interference.

Any gap between the trailing edge of a sheet and the leading edge of a succeeding sheet, which may result from improper feeding, and which is of such distance that the speed of the conveyor drive would cause the front edge of the succeeding sheet to abut or interfere with the trailing edge of the previous sheet being guided is critical. It is this critical gap which determines the lengths and arrangement of baffle 15 and detector finger 16.

In operation this device performs as follows: sheets fed in partially lapped relation pass down the conveyor without obstruction, the first sheet serving to raise the detector finger 16 and allowing the baffle 15 to rest on the top of sheets passing therebeneath. When a gap in feeding occurs which is within the critical range described,

the baffle 15 catches the sheet behind and prevents a further motion of this sheet down the feedboard.

When the gap is greater than the critical range or such that a sheet passes out from beneath detector finger 16 before a subsequent sheet reaches the baffle, which condition would not cause interference, then the baffle 15 drops to the feedboard 18, but is raised again as detector finger 16 drops off the trailing edge of the sheet ahead.

It is not necessary to limit the application of the invention to lapped sheet conveyance. In fact, it will operate equally as effectively in conjunction with feeders which feed sheets in serial or non-lapped sequence, where sheets might be fed out of time, or feeders which feed either lapped or serially, just as long as gaps within a critical range control the baffling of sheets as described. It is also to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In combination with a conveyor for advancing sheets along a defined path, a sheet baffle, a sheet operated detector finger, and means whereby movement of the detector finger into or out of the defined path of sheet travel is transmitted to the sheet baffle to move said baffle respectively out of or into the defined path of sheet travel.

2. In combination with a conveyor for advancing partially lapped sheets along a defined path, a sheet baffle above the path of sheets including a surface arranged to rest on sheets passing therebeneath, a support for said baffle which permits it to drop across the path of sheet advance in the absence of a sheet, and retaining means to hold said baffle across the defined path of sheet travel.

3. In combination with a conveyor for advancing partially lapped sheets along a defined path, a projection to raise a portion of the advancing sheets above said path, a sheet baffle above the path of sheets including a surface ar-

ranged to rest on sheets passing therebeneath, and a support for said baffle which permits it to drop across the path of sheet advance adjacent said projection in the absence of a sheet.

4. In combination with a conveyor for advancing partially lapped sheets along a defined path, a sheet baffle above the path of sheets including a surface arranged to rest on sheets passing therebeneath, a support for said baffle which permits it to drop across the path of sheet advance in the absence of a sheet, a detector finger between said baffle and the discharge end of the conveyor movable into and out of the path of sheets responsive to sheets passing therebeneath, and means on said detector finger to prevent said baffle from dropping across the path of sheet advance when no sheet is under said detector finger.

5. In combination with a conveyor for advancing sheets along a defined path, a sheet baffle and detector means responsive to the gap between successive sheets for operating the baffle, said baffle and said detector spaced longitudinally along the path of sheet travel and defining a predetermined gap for controlling the operation of said baffle.

6. In combination with a conveyor for advancing sheets along a defined path, a sheet baffle and detector means responsive to the gap between successive sheets for operating the baffle, said baffle and said detector spaced longitudinally along and above the path of sheet travel and defining a maximum predetermined gap for operating said baffle down.

7. In combination with a conveyor for advancing sheets along a defined path, a sheet baffle and detector means responsive to the gap between successive sheets for operating the baffle, said baffle and said detector spaced longitudinally along and above the path of sheet travel and defining a maximum predetermined gap for operating said baffle down and a minimum predetermined gap for operating said baffle up.

8. The method of conveying sheets in lapped formation from a pile to a machine, wherein relative motion between a leading sheet and the following sheets is produced during a registering operation, which comprises baffling the passage of sheets immediately following a gap in the lapped formation of the sheets.

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