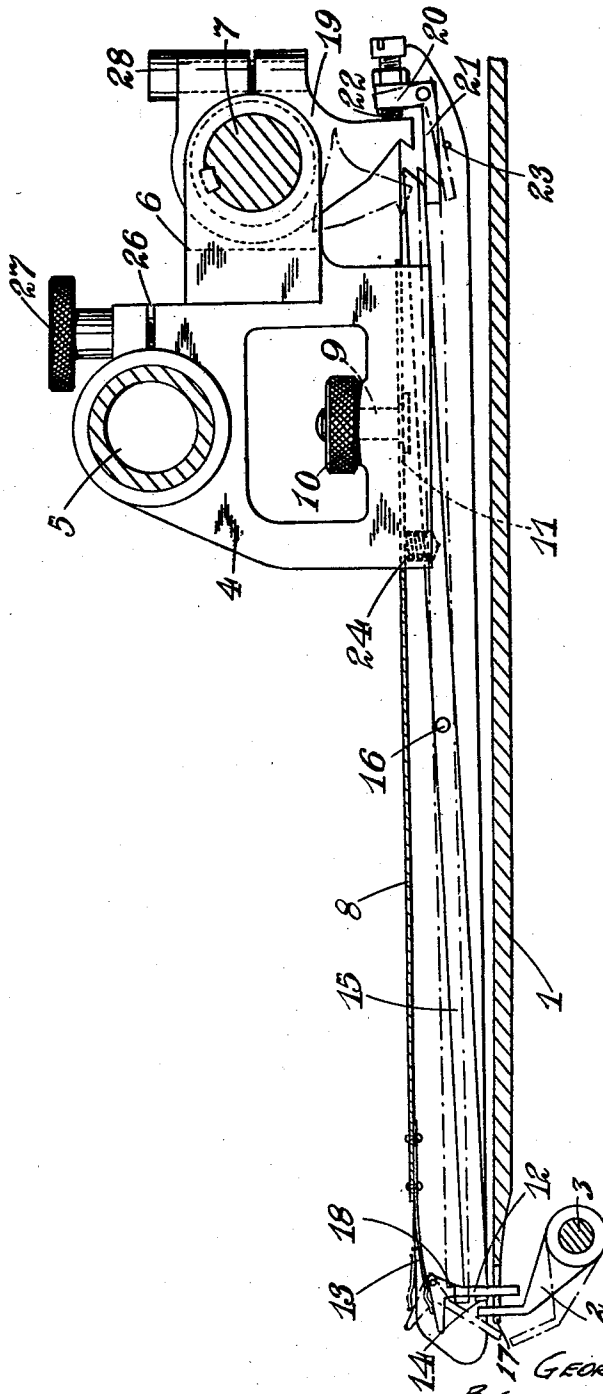


Dec. 18, 1951

G. W. TEBBS
FRONT EDGE DETECTOR MECHANISM FOR
USE IN SHEET FEEDING APPARATUS
Filed July 29, 1947

2,579,406



INVENTOR

GEORGE W. TEBBS

By *Young, Emery & Thompson*
ATTYs.

UNITED STATES PATENT OFFICE

2,579,406

FRONT EDGE DETECTOR MECHANISM FOR
USE IN SHEET FEEDING APPARATUSGeorge William Tebbs, Woodford Green, England,
assignor to Headley Townsend Backhouse,
Wentworth, Surrey, EnglandApplication July 29, 1947, Serial No. 764,314
In Great Britain March 21, 1946Section 1, Public Law 690, August 8, 1946
Patent expires March 21, 1966

8 Claims. (Cl. 271-56)

1

This invention comprises improvements in or relating to front edge detector mechanism for use in sheet feeding apparatus. The invention is concerned with sheet feeding apparatus of the kind (hereinafter referred to as the kind described) in which sheets of paper or the like are removed in succession from a pile and fed on to a lay-board where, by means of lays or the equivalent, registration of the sheets is effected before they are transferred to a printing or other machine. In one form of such apparatus with which the invention is particularly, but not exclusively, concerned the sheets approach the lay-board in a continuous stream of partly overlapping sheets. Sheet feeding apparatus of this form are commonly known as stream-feeders.

It is an object of the invention to provide in sheet feeding apparatus of the kind described new or improved mechanism for detecting the non-arrival or delayed arrival of a sheet at the lays and for stopping the feeding of the sheets and/or operating a warning device should such an event occur.

With the above object in view the invention provides, in or for sheet feeding apparatus of the kind described front edge detector mechanism comprising a feeler movably supported in the path of the sheets at or near the front lays and arranged for movement by each sheet in turn as the sheet approaches or reaches the front lays and sensing mechanism operated in timed relationship with the sheet feeding mechanism for determining whether or not the feeler has been moved as aforesaid by a correctly placed sheet. In the preferred form of the invention the sensing mechanism is arranged, on sensing that the feeler has not been moved, for causing stoppage of the feeding of the sheets and/or the operation of a warning device.

In a convenient form of the invention the feeler comprises a pivoted arm arranged to be moved about its pivot by the sheets as they approach or reach the front lays. The sensing mechanism may comprise an arm or the equivalent constantly oscillated in timed relationship with the feeding of the sheets in combination with trip mechanism having a stop presented for engagement by the sensing arm during each forward movement thereof and on such engagement to restrict further movement of the arm but arranged to be withdrawn from said path on each movement of the feeler as aforesaid, the operation of the sensing mechanism being so timed that each sheet as it arrives at or approaches the lays in proper sequence causes the stop to be

2

withdrawn before engagement with the sensing arm but should a sheet be delayed or fail to feed the stop will engage the arm and cause the stoppage of the feeder or the operation of the warning device.

In the preferred construction of the invention the trip mechanism comprises a lever which is spring-urged from a stop position in which one end of the lever, constituting the stop, lies in the path of the sensing arm as aforesaid and the other arm has a latching engagement with the feeler such that the lever is prevented from moving out of the stop position until the feeler is moved by a sheet whereby unless such movement of the feeler occurs at the appropriate time the lever engages and stops the sensing arm. The trip mechanism may include a re-setting device operable to re-set the lever into the stop position between the feeding of each sheet and comprising a bell crank of which one arm is arranged for engagement by the sensing arm near the end of the backward stroke thereof and the bell crank is thereby given a movement of rotation about its pivot and the other arm is arranged, on such rotation, to re-set the lever into the stop position. Preferably the re-setting device is arranged to hold the lever in the stop position and out of contact with the feeler during the period when the feeler is engaged and moved by a properly fed sheet whereby the resistance to movement of the feeler by the sheet is reduced.

One specific form of the mechanism according to the invention will now be described by way of example and with reference to the accompanying drawing which represents a side view of the mechanism. In this example the mechanism is intended for use in a stream feeder which feeds the sheets in overlapped formation on to a lay-board 1 having front lays in the form of arms 2 pivoted on a cross shaft 3 below the board and, during the registration period, extending above the board to provide registration stops. The mechanism comprises a bracket 4 adjustable along a fixed cross shaft 5 mounted above the lay-board and behind the front lays. The bracket has a rearward extension 6 constituting a bearing for an oscillating shaft 7. Extending in the forward direction from the underside of the bracket substantially parallel to the lay-board there is an arm 8 of inverted channel section. The arm reaches to the front edge of the lay-board. A bolt 9 and knurled nut 10 are employed to secure the arm to the bracket and in order that a limited degree of lengthwise adjustment

of the arm may be made an elongated slot 11 for the bolt 9 is formed on the arm. Near the front end of the arm at a position just behind the front lays there is a pivoted lever 12 dependent from the arm and constituting the feeler. This feeler is urged into the vertical position by a spring 13. At its lower end the feeler is forked and embraces one end 14 of a lever 15 pivotally supported at 16 within the channel section of the arm 8 and extending lengthwise of the arm. When in its normal, vertical position the lower end of the feeler extends into a slot 17 cut in the lay-board. When the feeler is engaged by a sheet being moved in the feeding direction it is swung about its pivot into the position shown in chain lines and the sheet slides under the end of the feeler. The lever 15 has a step 18 at the end embraced by the forked feeler and is arranged to limit the rearward movement of the feeler. Further the stepped end 14 constitutes a latch engaging the feeler and so arranged that when the feeler is in the vertical position rotation of the lever about its pivot support in the clockwise direction as viewed in the figure is prevented but is permitted when the feeler has been moved by a sheet into the chain line position.

Dependent from the oscillating shaft 7 there is an arm 19—the sensing arm—which oscillates above the end of the lever 15 remote from the feeler. This arm is arranged near the end of its backward stroke to engage one arm 20 of a bell crank lever of which the other arm 21 engages underneath the end of the lever 15. An adjusting screw 22 on the bell crank lever is used to determine the exact position at which it is engaged by the sensing arm. The bell crank is pivoted within the arm 8 and a suitable stop 23 limits the rotation of the crank in the anticlockwise direction.

The mechanism functions in the following manner. When a sheet is approaching the feeler 12 the lever 15 is in latching engagement with the feeler at its front end and its rear end is elevated into the path of the oscillating sensing arm 19. Should a sheet fail to arrive at the feeler at the correct time the oscillating arm in its forward travel will engage the end of the lever and its movement will be stopped which, by suitable well known means not shown, causes the feeding of the sheets to be stopped. If on the other hand the feeding is proceeding normally and a sheet arrives at the feeler in the correct timed relationship the feeler will be moved—into the chain line position—which releases the latching engagement of the lever and permits a spring 24 to move the lever out of the path of the forward stroke of the sensing arm. During the backward stroke the sensing arm engages the arm 20 of the bell crank and rotates the bell crank to cause the arm 21 thereof to return the lever 15 into the position in which its front end is in latching engagement with the feeler and its rear end lies in the path of the sensing arm.

In order to reduce the resistance to movement offered by the feeler to the paper the sensing arm is arranged to maintain the bell crank in engagement with the lever and thereby to maintain the front end of the lever out of actual contact with the feeler during the period within which a correctly placed sheet will engage the feeler.

It is to be understood that more than one feeler and associated sensing device may be provided and spaced apart across the width of the lay-board. It is also to be understood that the detec-

tor-mechanism described above is adjustable in position in a direction across the width of the lay-board and that for this purpose the bracket 4 is split at 26 and provided with a clamping screw 27 whereby it may be clamped on the shaft 5 and the sensing arm is also split and provided with a screw 28 for clamping on the shaft 7.

I claim:

1. Front edge detector mechanism for sheet feeding apparatus of the kind described and embodying a layboard and front lays up to which the front edge of each sheet in turn is moved for registration, said mechanism comprising a feeler in the form of a pivoted arm arranged to be partially rotated about its pivot by engagement with the front edge of each sheet in turn as it approaches the front lays, a sensing member providing a sensing abutment arranged to be constantly oscillated in timed relationship with the feeding of the sheets, a stop member intermediate between the feeler and the sensing abutment and having a releasable latching engagement with the feeler by which the stop member is held in a position in which it lies in the path of the sensing abutment and is operative to engage the abutment and stop the movement of the sensing member, the latching engagement being releasable on movement of the feeler as aforesaid by a correctly timed sheet, means for constantly urging the stop member against the latch control of the feeler to a position outside the path of the sensing abutment in which the stop member is inoperative to stop the sensing member and secondary means comprising a member movable in timed relationship with the feeding of the sheets to engage and temporarily to support the stop member against the said urging means during the time when the feeler is to be engaged by a correctly presented sheet thereby to relieve the feeler of frictional engagement with the stop member during that time and to allow the feeler to be freely moved by such a sheet to a position in which the feeler releases the latching engagement of the stop member and the stop member is permitted to move to the inoperative position on removal of the temporary support.

2. Front edge detector mechanism as claimed in claim 1 in which a spring is employed as the means for urging the stop member towards the inoperative position.

3. Front edge detector mechanism as claimed in claim 1 in which the intermediate stop member comprises a lever of which one end makes the latching engagement with the feeler and the other end lies in the path of the sensing abutment as aforesaid.

4. Front edge detector mechanism as claimed in claim 3 in which the intermediate stop lever extends in the direction of the feed of the sheets rearwardly away from the front lays.

5. Front edge detector mechanism as claimed in claim 1 in which the secondary means also constitute a re-setting device operable to re-set the intermediate member into the operative position between the feeding of successive sheets.

6. Front edge detector mechanism as claimed in claim 5 in which the secondary means comprise a bell-crank of which one arm is arranged for engagement by the sensing member near the end of the backward strokes thereof and the bell-crank is thereby given a movement of rotation about its pivot and the other arm is arranged on such rotation, to reset the intermediate member into the operative position.

7. A sheet feeding mechanism of the kind de-

5

scribed and having a layboard, which mechanism embodies front edge detector mechanism comprising a support arm, extending over the layboard, a feeler pivotally attached to one end of the arm and dependent therefrom, a primary lever extending lengthwise of the arm and pivoted thereto intermediate in the length of the lever, one end of the lever making releasable latching engagement with the feeler to prevent upward movement of that end of the lever and the other end of the lever constituting a stop, spring means constantly urging the first mentioned end upwardly against the latching engagement with the feeler, a sensing arm arranged for constant oscillation towards and from the stop end of the lever which end, when the lever is in the latched position, lies in the path of the sensing arm on its forward stroke to stop movement thereof but may be moved clear thereof by the spring means when unlatched, and a secondary lever pivoted to the support arm adjacent the stop end of the primary lever and having two arms of which one underlies and is adjacent to the stop end of the primary lever and the other lies in the path of the sensing arm towards the end of its backward movement whereby when the sensing arm is at the backward end of its movement the secondary lever is rotated by the sensing arm to engage and raise the stop end of the primary lever thereby to reset the lever to the latching position and also temporarily to support the primary lever and to relieve the feeler of frictional engagement with the primary lever to allow the feeler to be freely moved by a correctly placed sheet.

8. Front edge detector mechanism for sheet feeding apparatus of the kind described and embodying a layboard and front lays up to which the front edge of each sheet in turn is moved for registration, said mechanism comprising a feeler

6

in the form of a pivoted arm arranged to be partially rotated about its pivot by engagement with the front edge of each sheet in turn as it approaches the front lays, a sensing member providing a sensing abutment thereon to be constantly oscillated in timed relationship with the feeding of the sheets, a stop member intermediate between the feeler and the sensing abutment and having a releasable latching engagement with the feeler by which the stop member is held in a position in which it lies in the path of the sensing abutment and is operative to engage the abutment and to stop the movement of the sensing member, the latching engagement being releasable on movement of the feeler as aforesaid by a correctly timed sheet, means for constantly urging the stop member against the latch control of the feeler to a position in which the stop member lies outside the path of the sensing abutment and is inoperative to stop the sensing member, and secondary means operable by movements of the sensing member to reset the stop member to the operative position between the feeding of successive sheets.

GEORGE WILLIAM TEBBS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
625,094	Dexter	May 16, 1899
765,414	Dexter	July 19, 1904
1,603,349	Marquardt	Oct. 19, 1926
2,433,120	Harrold	Dec. 23, 1947

FOREIGN PATENTS

Number	Country	Date
20,685	Great Britain	Sept. 19, 1912