

Jan. 15, 1963

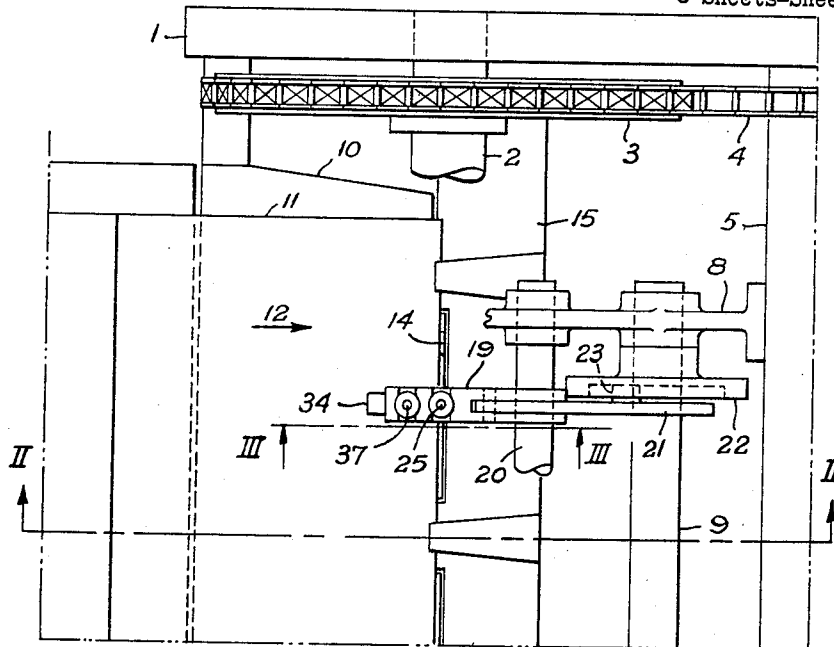
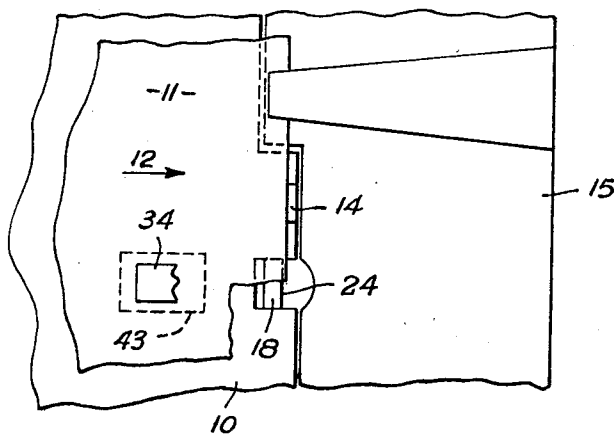
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3,073,592

SHEET FEEDING APPARATUS

Filed June 15, 1961

3 Sheets-Sheet 1



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SHEET FEEDING APPARATUS

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3 Sheets-Sheet 2

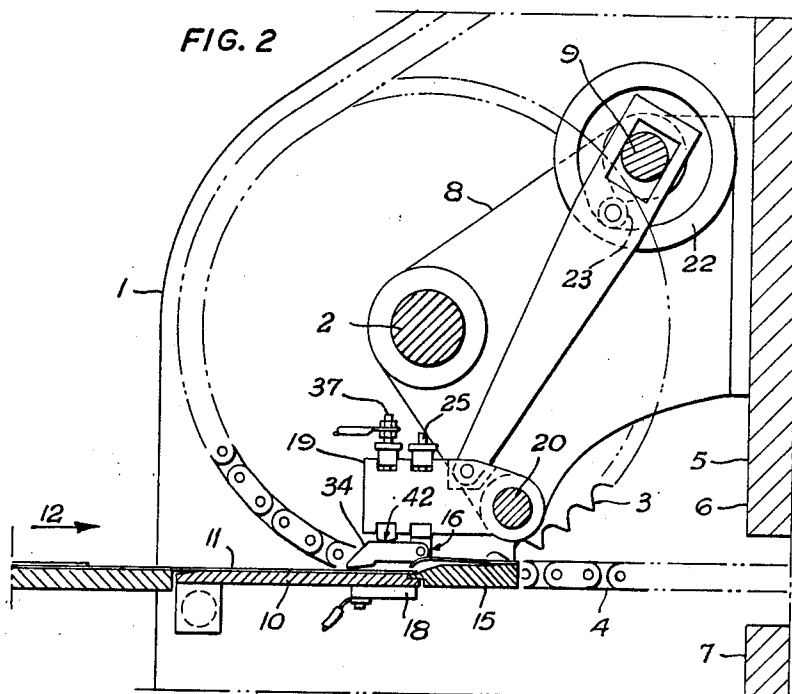
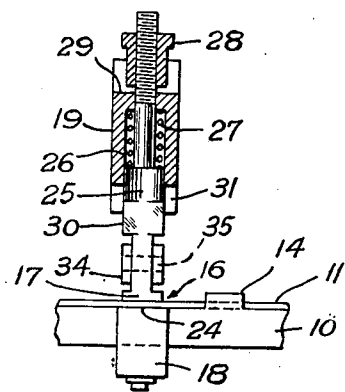


FIG. 6

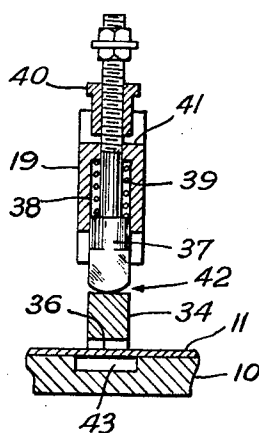


FIG. 7

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SHEET FEEDING APPARATUS

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3 Sheets-Sheet 3

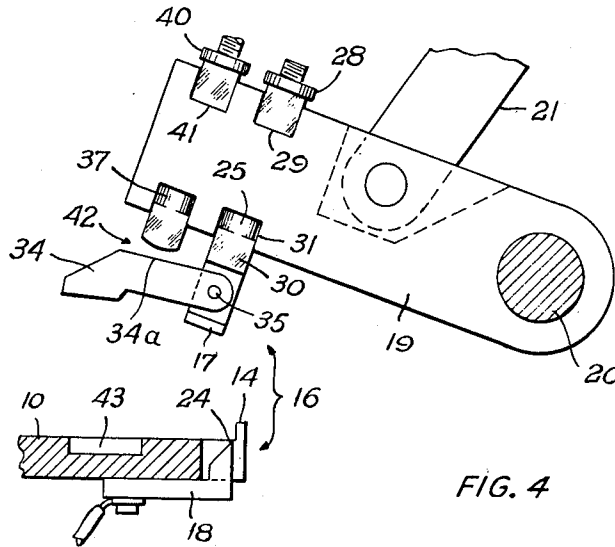


FIG. 4

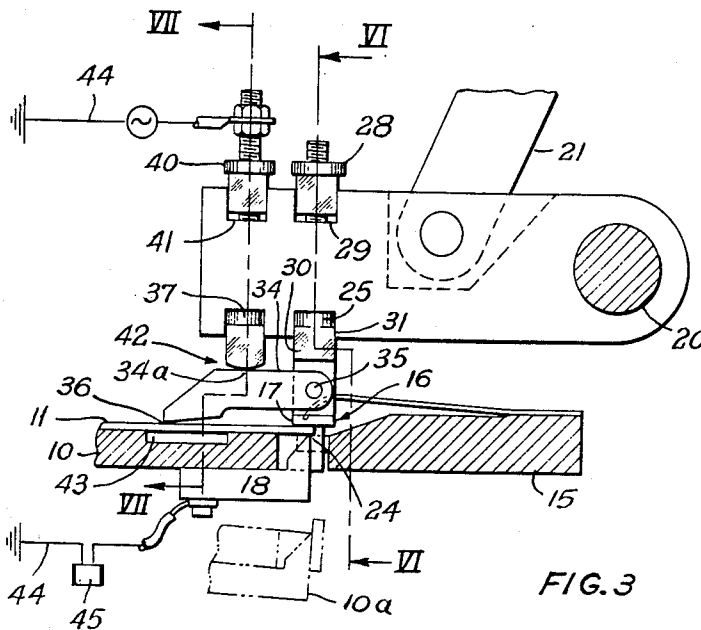


FIG. 3

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3,073,592

SHEET FEEDING APPARATUS

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5 Claims. (Cl. 271-57)

This invention relates to sheet feeding apparatus of the kind wherein sheets are fed sequentially to a register position and wherein means are provided to indicate a register fault.

It is sometimes necessary to work such apparatus without a sheet being present in the register position. For example, where sheets are fed automatically from a pile when the sheet feeding operation is started in the first instance, some time inevitably elapses between the first sheet leaving the pile and the arrival of this sheet at the register position, and it is undesirable for a register fault to be indicated during this time lapse.

The main object of this invention is to provide automatic means for overcoming this difficulty.

According to this invention, a register fault indicating device for use in apparatus wherein sheets are fed sequentially in a determined direction into a register position comprises current conducting means defining an electric circuit, establishment of said circuit defining a register fault indication, a first and a second switch connected in series in said circuit, said switches being normally open and the circuit being thereby in disestablished condition, means responsive to the absence of a sheet at said register position and connected to said first switch to close the latter only when no sheet is present at said register position, each sheet during the feed thereof to the register position passing a position spaced from the register position rearwards in respect to the direction of travel of the sheet by a distance which is less than the length of the sheet as measured in said direction, means responsive to the presence of a sheet at said spaced position and connected to close said second switch only when a sheet is present at said spaced position, whereby said circuit is established only if the sheet during the feed thereof reaches said spaced position but fails to reach said register position.

One embodiment of this invention will now be described with reference to the accompanying drawings wherein:

FIG. 1 is a plan view of a part of a press and sheet feeding apparatus therefor.

FIG. 2 is a section on the line II-II in FIG. 1.

FIG. 3 is an enlarged section on the line III-III in FIG. 1.

FIG. 4 shows the details of FIG. 3 in a different operational position.

FIG. 5 is a plan view of FIG. 3 showing selected details only.

FIG. 6 is a section on the line VI-VI in FIG. 3.

FIG. 7 is a section on the line VII-VII in FIG. 3.

Referring to the drawings, FIGS. 1, 2 show a frame 1 supporting a shaft 2 to which is secured a sprocket 3 over which is trained a chain 4. It is to be understood that the frame 1 is one of a pair of such frames between which the shaft 2 extends; that the sprocket 3 is one of a pair of such sprockets situated at the respective ends of the shaft 2; and that the chain 4 is one of a pair of such chains connected to the respective sprockets 3. Between the frames 1 there is provided a press 5 defined by a fixed platen 6 and a movable platen 7. The platen 6 has secured thereto a bearing bracket 8 supporting a shaft 9.

Referring now also to FIGS. 3 to 7, there is shown a feed table 10 over which a sheet of cardboard 11 is shown as having been fed in the direction of the arrow 12 into

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a register position in which the sheet is stopped at the leading edge thereof by front lays 14 (only one shown) provided on the table 10. A gripper 15 is adapted to receive and grip the sheet 11 for subsequent transfer to the press 5. The gripper 15 is one of a plurality of such grippers connected to the chains 4, and the chains 4 are driven by the sprockets 3 and shaft 2 to move the grippers sequentially into a sheet reception position, this being the position adjacent the table 10 as shown for instance in FIG. 1, where successive grippers receive successive sheets 11 and whence the chains 4 move the grippers to the press 5. The shaft 2 is driven with an intermittent motion timed for each gripper 15 to stop for the reception of one sheet 11. The period between the appearance of successive grippers at the table 10 defines the time cycle of the shaft 2. The table 10 is adapted to be lowered into the position 10a (FIG. 3) to remove the lay 14 from the sheet 11 to free the path thereof for resumption of travel under the influence of the gripper 15.

The presence of the sheet 11 at the lay 14 is sensed or detected by an electric switch 16 comprising contacts 17, 18. The contact 17 is connected to the table 10. The contact 18 is connected to an arm 19 pivoted to a stationary rod 20 supported by the bracket 8. The arm 19 is moved between a lowered position (FIGS. 1, 3) and a raised position (FIG. 4), the movement being generated by a cam 22 secured to the shaft 9 and acting through a follower 23 on a link 21 connected to the arm 19. The shaft 9 is rotated continuously and makes one revolution per cycle of the shaft 2, and the cam 22 is timed for the arm 19 to be lowered into the FIG. 3 position between the time when the sheet 11 is supposed to engage the lay 14 and the time when the gripper 15 grips the sheet 11. The extremity of the contact 18 comprises a knife edge 24 positioned to be situated under the sheet 11 and in close proximity with the edge thereof engaging the lay 14. If, due to a fault, the sheet 11 has failed to reach the lay 14, the contacts 17, 18 engage each other upon lowering of the arm 19 into the FIG. 3 position. However, if the sheet 11 is properly in engagement with the lay 14, the sheet 11 prevents the contacts 17, 18 from engaging. The contact 17 comprises a plunger 25 seated in a bore 26 (FIG. 6) in the arm 19 and supported therein by a spring 27 arranged to be slightly compressed when the contact 17 engages the sheet 11 or the contact 18, as the case may be, thereby to ensure that the pressure exerted by the contact 17 is a resilient one. A nut 28 on the plunger 25 is positioned to engage a surface 29 of the arm 19 to retain the plunger 25 in the bore 26. A square neck 30 of the plunger 25 engages a recess 31 in the arm 19 to prevent rotation of the plunger 25.

A feeler or finger 34 is pivotally connected at one end by a pin 35 to the plunger 25 and is positioned for the other or free end to contact the sheet 11 at a point 36 lying a predetermined distance behind the lay 14. A plunger 37 seated in a bore 38 of the arm 19 presses the finger 34 onto the sheet 11, the pressure of the plunger 37 being resilient by virtue of a spring 39. A nut 40 provided on the plunger 37 is positioned to engage a surface 41 of the arm 19 to limit the movement of plunger 37 under the action of the spring 39. The finger 34 and plunger 37 define contacts of a switch 42. The nuts 28, 40 are so set that when the arm 19 is raised the finger 34 falls clear of the plunger 37 (FIG. 4) thus opening the switch 42. However, the relative position of the plungers 25, 37 is such that when the arm 19 is lowered, engagement between the sheet 11 and the finger 34 causes the latter to rise into engagement with the plunger 37 substantially at the time when the terminals 17, 18 make contact.

The table 10 is provided with a recess 43 normally cov-

ered by the sheet 11, but if no sheet is present at the recess 43, the finger 34 enters the recess and fails to engage the plunger 37 notwithstanding engagement taking place between the contacts 17, 18.

The arm 19 and the table 10 are made of an insulating material. The finger 34 and plunger 37, along with the plunger 25, are made of conductive material. Conductors 44 are connected to the plunger 37 and to the contact 18, the plunger 37 being connected through the finger 34 to the plunger 25 and thus to the contact 17. The conductors 44 define an electric circuit in which the switches 16, 42 lie in series, the finger 34 itself defining the in-series connection between the switches 16, 42.

It will be appreciated that the connection between the plungers 25, 37 need not be directly by means of the finger 34 so long as there is a conductive connection between the contact 17 and a contact provided on the finger at 34a in position to engage the plunger 37.

During normal working the circuit 44 cannot be established because the contacts 17, 18 are separated by the sheet 11. If there is a register fault, i.e. if the leading edge of the sheet 11 fails to reach the contact 18, the circuit 44 is established by engagement between the contacts 17, 18, and this will occur if the leading edge of the sheet 11 reaches a position anywhere beyond the point 36 but short of the contact 18. However, if no sheet is passed at all, the circuit 44 remains broken at the switch 42.

It will be seen that establishment of the circuit 44 produces a flow of current signifying a register fault, i.e. defining a register fault indication.

The distance between the contact 18 and the point 36 is to some extent arbitrary and is made to suit the requirements of the particular construction shown.

Certain aspects of the apparatus will now be mentioned without reference to drawing. The sheets 11 are fed to the lay 14 automatically from a pile by a sheet feeding machine or feeder driven by the press in timed relationship therewith, and the press in turn is driven by a drive means including an electromagnetic clutch and brake mechanism operated by a relay 45 included in the circuit 44 and functioning in such a way that when a circuit is established the clutch is disengaged to interrupt the drive to the press and the brake is engaged to stop the press substantially instantly. Such clutch and brake mechanisms are known per se.

When said press and feeder are started in the first instance some time elapses before the first sheet of said pile has travelled to the table 10 and lay 14 and during this time it is obviously necessary to avoid establishment of the circuit 44 to avoid stopping the press. This is done by the operation of the finger 34 as described, but as soon as the leading edge of the first sheet passes beyond the point 36 the switches 16, 42 become operative to respond to a register fault, if any.

Said feeder is driven by the press through a manually operable clutch so that the press can be run (as for test purposes) without the feeder operating. In this case, it is likewise necessary for the circuit 44 to remain disestablished.

What I claim and desire to secure by Letters Patent is:

1. A register fault indicating device for use in apparatus wherein sheets are fed sequentially in a determined direction into a register position comprising current conducting means defining an electric circuit, establishment of said circuit defining a register fault indication, a first and a second switch connected in series in said circuit, said switches being normally open and the circuit being thereby in disestablished condition, said first switch being defined by a pair of upper and lower contacts situated respectively above and below the register position of the sheets, means for moving the upper contact into and from engagement with the lower contact, the absence or presence of a sheet at the register position respectively

allowing or disallowing such engagement, each sheet during the feed thereof to the register position passing a position spaced from the register position rearwardly in respect to the direction of travel of the sheet by a distance which is less than the length of the sheet as measured in said direction, a table over which said sheets are fed, a feeler situated above said table at said spaced position of the sheets, a member on which said feeler is movably supported, and means for moving said member toward and from the table thereby to move the feeder to sense the presence of a sheet on said table, said feeler—upon encountering a sheet—being moved relative to said member and cooperating by such movement to close said second switch, whereby said circuit is established only if a sheet during the feed thereof reaches said spaced position but fails to reach said register position.

2. A device according to claim 1, said table being provided in the upper surface thereof with a recess positioned to accommodate said feeler when the latter is moved towards the table and no sheet is present thereon in said spaced position.

3. A register fault indicating device for use in apparatus wherein sheets are fed sequentially in a determined direction into a register position comprising current conducting means defining an electric circuit, establishment of said circuit defining a register fault indication, a first and a second switch connected in series in said circuit, said switches being normally open and the circuit being thereby in disestablished condition, a table over which said sheets are fed, a member situated above the table, a pair of contacts defining said first switch and connected respectively to said member and said table, means for moving the member toward and from the table periodically to move the contacts into and out of engagement, the absence or presence of a sheet at the register position respectively allowing or disallowing such engagement, a feeler supported on said member for movement relative thereto, first and second contacts defining said second switch and supported respectively by said feeler and said member, the member co-operating by said movement thereof to move the feeler toward and from the table in synchronism with the corresponding movement of the contact of the first switch supported on the member, each sheet during the feed thereof to the register position passing a position spaced from the register position rearwardly in respect to the direction of travel of the sheet by a distance which is less than the length of the sheet as measured in said direction, and the feeler being dimensioned upon being moved toward the table to engage a sheet situated in said spaced position and by such engagement to be moved relative to said member and by such movement to close the second switch, absence of a sheet at said spaced position resulting in that the feeler is not moved relative to the member and the second switch is correspondingly not closed.

4. A device according to claim 3, said feeler being conductively connected to that contact of the first switch which is connected to said member, such conductive connection co-operating to produce said in-series connection between said first and second switch.

5. A device according to claim 4, said feeler being made of conductive material and itself defining said first contact of said second switch.

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