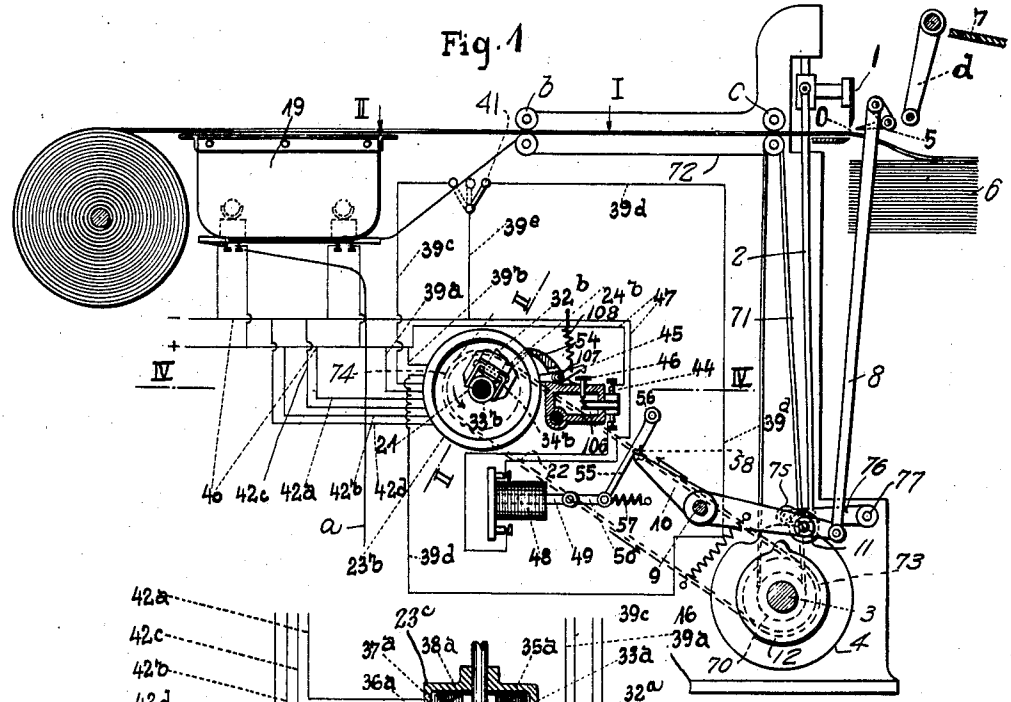
Oct. 18, 1932. G. SPIESS 1,883,858

SHEET CUTTING MACHINE

Original Filed April 14, 1927 2 Sheets-Sheet 1

Fig. 1



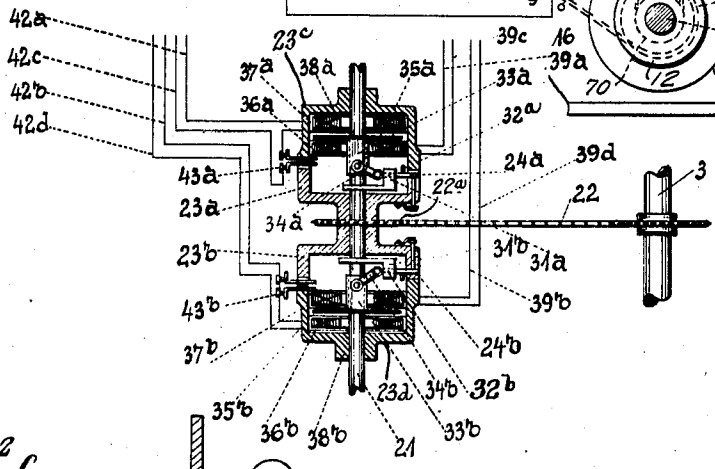


Fig. 2

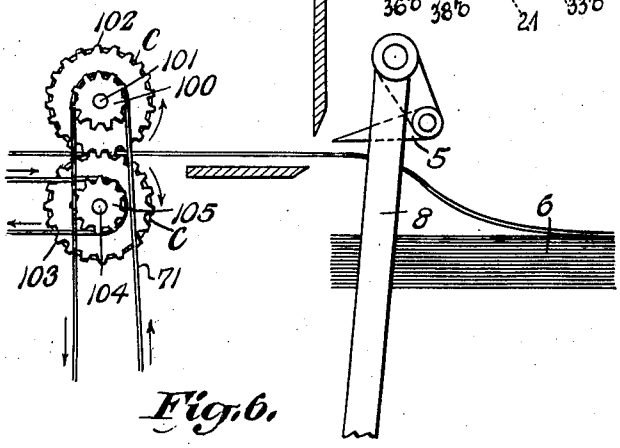


Fig. 6.

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SHEET CUTTING MACHINE

Original Filed April 14, 1927 2 Sheets-Sheet 2

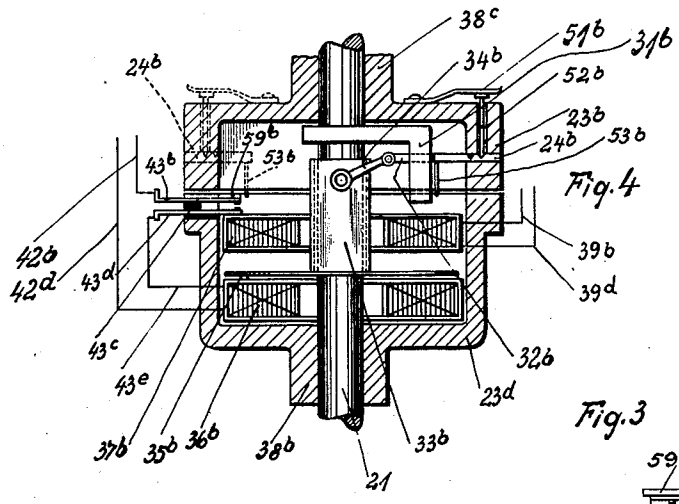


Fig. 4

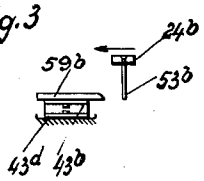


Fig. 3

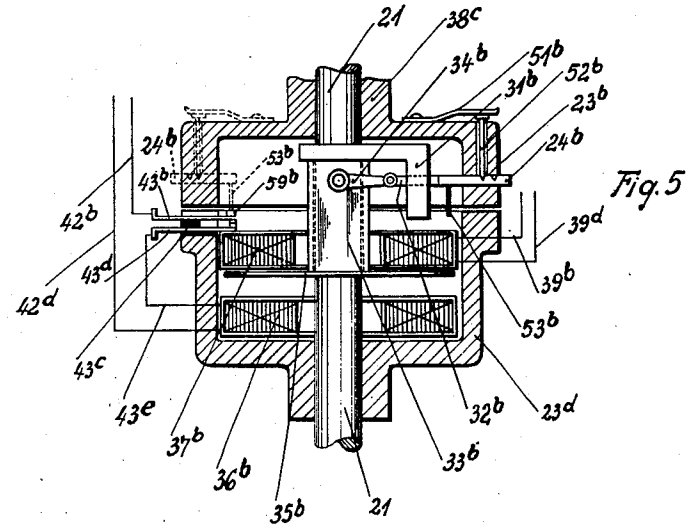


Fig. 5

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UNITED STATES PATENT OFFICE

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SHEET CUTTING MACHINE

Original application filed April 14, 1927, Serial No. 183,746, and in Germany April 24, 1926. Divided and this application filed February 24, 1928. Serial No. 256,629.

My invention relates to a sorting device for sheet cutting machines by which defective sheets are deflected to a separate pile.

As described in my prior patent of the United States, No. 1,810,442, dated June 16, 1931, means are provided for causing a switch for the grading appliance to lag with respect to its operating mechanism for a period corresponding to the distance to which the defective sheet is moved from the inspection station, until the line along which the sheets are severed from the web, is in proper position below the blade of the severing mechanism.

In my said prior patent I have described a machine of this kind in which hand-operated means are provided for placing a grading appliance into operative position. It is an object of the present invention to provide electrical means for the same purpose.

To this end I provide a continuously operated rotary member or disc equipped with controlling means for an electric circuit which circuit comprises means for reversing the switch for the "good" and "bad" piles, and I provide an operator's switch for moving the controlling means on the disc into active position with respect to contacting means in the reversing circuit. The lag of the pile switch with respect to the manipulation of the operator's switch is due to the rotation of the disc as the controlling means in connection with the disc which are prepared for action by operator's switch, will get into operative position with respect to the contacting means in the reversing circuit not immediately after the operator's switch has been closed, but only after the disc has performed part of its rotation, so that a certain time will elapse between the closing of the operator's switch and the operation of the contacting means in the reversing circuit. The distance of the inspection station from the cutter may be equal twice the length of a sheet, and the disc performs about two revolutions before the pile switch will be reversed.

In the drawings affixed to this specification and forming part thereof, a machine equipped with a grading appliance embodying my invention and connected with electrical means is illustrated diagrammatically by way of example.

In the drawings,

Fig. 1 is an elevation of the machine,

Fig. 2 is a section on the line II—II in Fig. 1,

Fig. 3 is an end elevation of a contact adapted to cooperate with the switch-actuating mechanism,

Figs. 4 and 5 are sections on the line IV—IV in Fig. 1 showing a part of the actuating mechanism in inactive and in operative position, respectively.

Referring now to the drawings and first to Figs. 1 and 2, *a* is the frame of the machine, 3 is the main driving shaft to which rotation is imparted by any suitable means, not shown, 70 is a sprocket on the driving shaft 3, *b* and *c* are pairs of feed rollers for moving the sheets through the machine, 71 is a chain extending from the sprocket 70 to a sprocket 100 on the shaft 101 of the upper roller in the last pair of rollers *c*, 102 and 103 are spur gears on the shafts 101 and 104 of the upper and lower rollers in the pair *c*, respectively, 105 is a sprocket on the shaft 104 of the lower roller, and 72 is a chain connecting the sprocket 105 with a corresponding sprocket, not shown, on the first pair of rollers *b*, so that the feeding mechanism is actuated from the shaft 3. 22 is a chain on a sprocket 73 on the shaft 3, and a sprocket 74 on the rotary contacting member which is fitted to rotate on the horizontal rod 21, as described in my said prior patent. 10 is a bell-crank lever which is fulcrumed in the frame *a* at 9, 5 is a switch for deflecting the sheets to the "good pile" 6 or to the "bad pile" 7 according to the position of the switch, *d* is a bridge extending from the switch 5 to the bad pile 7, and 8 is a rod connecting the switch 5 with the bell-crank lever 10. 11 is a roller on the bell-crank lever 10, 12 is a cam plate on the shaft 3 by which the bell-crank lever 10 is rocked through the medium of the roller 11, and 16 is a spring which tends to hold the roller 11 in contact with the cam plate 12 so that the bell-crank lever 10, unless engaged by the locking means 55 holding the roller 11 beyond reach of the cam 12, as will be described,

is rocked by the cam plate 12 and in turn rocks the switch 5.

75 is a roller at the end of a lever 76 which is fulcrumed in the frame *a* at 77, 4 is a cam plate which is secured on the cam 3 at the side of the cam plate 12, 78 is a depression in the cam plate, and 2 is a rod by which the bell-crank lever 76 is connected with the cutter 1. While the roller 75 is supported on the concentric part of the cam plate 4, the cutter 1 is held in its uppermost position, but when the depression 78 arrives at the roller 75, the cutter 1 descends under the action of gravity or of springs, not shown, and severs the sheet at 0.

In the present instance the hollow member or disc has been subdivided into a rotary central part having two switching units 23*a* and 23*b*, and a stationary unit 23*c* and 23*d* opposite the outer ends of the respective rotary units 23*a* and 23*b*, all these parts being seated on the rod 21. The rotary central part is provided with a central sleeve 38*c* intermediate its units 23*a*, 23*b*, on which sleeve is secured a sprocket 22*a* adapted to be actuated by a chain 22 from a driving shaft 3, and the stationary units 23*c* and 23*d* are secured on the rod 21 by sleeves 38*a* and 38*b*, respectively. Two pairs of units have been provided in order to allot one unit to each operative position of the operator's switch 41 as will be described, and thus to enable the operator to discard two bad sheets in immediate succession. Pawls 24*a* and 24*b* are arranged in the rim of each disc, and brackets 31*a* and 31*b* are secured on the rod 21 so as not to rotate with the discs 23*a*, 23*b*. Slides 32*a* and 32*b* are carried in each bracket and connected with a sleeve 33*a* and 33*b* on the rod 21, respectively, by a link 34*a* and 34*b*. Secured to each sleeve there is an iron plate 35*a* and 35*b*, respectively; and annular electromagnets 36*a*, 37*a* and 36*b*, 37*b* are arranged on either side of the plates 35*a* and 35*b*, respectively, and secured in hollow supports 38*a* and 38*b*, respectively, which are held against rotation on the rod 21 and are so arranged on the rod that their hollow spaces form continuations of the hollow spaces in the discs 23*a* and 23*b*. 40 are line wires to which the electromagnets are connected by a wire 39*e* and a switch 41 which is adapted to be connected alternately with wires 39*c* and 39*d* which are connected to the electromagnets 37*a* and 37*b*, respectively, the return wires being 39*a* and 39*b*. In this manner the electromagnets are connected in parallel to the line wires 40. Similarly, the electromagnets 36*a* and 36*b* are connected with the line wires by wires 42*a* and 42*b*, the return wires being 42*c* and 42*d*. 43*a* and 43*b* are contacts which are arranged in the stationary supports 38*a* and 38*b* and adapted to be closed by the pawls 24*a* and 24*b*, as will be described below.

Fixed contact casings are arranged in line with the rotary units 23*a* and 23*b*, and 106, Fig. 1, is the casing which is allotted to the unit 23*b*. The casing is equipped with a lug 54 extending upwardly into the immediate vicinity of the casing 23*b*. 45 is a double-armed contacting lever which is mounted to rock about a pivot 107 in a recess at the base of the extension 54, with its shorter arm also extending into the immediate vicinity of the unit 23*b*, and 108 is a pull-back spring which tends to raise the longer arm of the lever. 46 is a contact pin which is controlled by the longer arm 45, and 44 are contact members under the control of the contact pin 46. The contact 44 is in a circuit 47 which is branched from the line wires 40. The casing for the unit 23*a* is exactly similar to the casing 106, and also equipped with a contact pin and contact members.

In the normal position, that is, with the switch 41 open, the electromagnets are all de-energized. The plates 35*a* and 35*b* are in the vicinity of the outer electromagnets 36*a* and 36*b* when the parts are in normal position. As the rod 21 is horizontal there is no tendency for the plates to leave this position but they may be retained by any suitable resilient or frictional means, not shown. In this position the slides 32*a* and 32*b* in the brackets 31*a* and 31*b* are retracted and do not act on the ends of the pawls 24*b* which are retained by a spring catch 52*b*, as will be described with reference to Figs. 4 and 5. The operation of the machine will now be described with reference to the units 23*b* and 23*d*, it being understood, of course, that the operation of the duplicate units 23*a* and 23*c* is exactly the same. The units 23*b* and 23*d* are actuated when the operator's switch 41 is connected with the wire 39*d* as shown in full lines in Fig. 1. Under normal conditions, the operator's switch is in the vertical neutral position shown in dotted lines in Fig. 1, the plate 35*b* is in the vicinity of the electromagnet 36*b*, and, through the medium of its sleeve 33*b* and the toggle 34*b*, has retracted the slide 32*b* out of reach of the pawl 24*b*, so that the pawl is free to rotate past the slide 32*b* in its stationary bracket 31*b* without being influenced by the slide. The catch 52*b* is adapted to engage two notches in the pawl 24*b* so as to hold the pawl in its two final positions, and 51*b* is a spring adapted to move the catch into the corresponding notch. 53*b* is a finger at the inner end of the pawl 24*b*, and 59*b* is a contact on the inner end of a contact spring 43*b* which is secured in an insulating bracket 43*c* on the stationary unit 23*d* and adapted to cooperate with a contact spring 43*d* which in turn is connected with the electromagnet 36*b* by means of a wire 43*e*. When the parts are in the position illustrated in Fig. 4, with the pawl 24*b* retracted, the finger 53*b* moves past the contact 59*b* without influencing it, as shown in dotted lines at the

left in Fig. 4. When, however, a defective sheet is detected at the station 19, the operator will move the switch 41 so as to make contact at the wire 39*d*. The electromagnet 37*b* is energized and attracts the plate 35*b* so as to straighten the toggle link 34*b* as shown in Fig. 5, and the slide 32*b* is pushed out of its bracket to advance the pawl 24*b* into active position with respect to the short arm of lever 45. When the short arm of the lever is engaged by the pawl 24*b* the pin 46 descends and closes the contact 44. 48 is an electromagnet in the circuit which when excited attracts its armature 49. The armature is connected to a pawl 55 on a pin 56. A pull-back spring 57 tends to hold the pawl engaged with the free end of the bell-crank lever 10 which engages a shoulder 58 on the pawl 55. It will be understood that when the contact 44 is closed by the pawl 24*b* as described, the bell-crank lever 10 will be released and the switch 5 will be thrown over for the "bad" pile on the plate 7.

When the pawl 24*b* reaches the contact 59*b* its finger 53*b* will strike the spring 43*b*, closing the contact at the spring 43*d* and energizing the electromagnet 36*b* which thereupon attracts the plate 35*b* and, through the medium of the sleeve 33*b* and the link 34*b*, retracts the slide 32*b*.

It will be understood that the pawl 24*b* is not moved immediately upon the operator throwing the switch 41 into contact with the wire 39*d* but only after the pawl which is rotating with its unit 23*b*, has come into contact with the slide 32*b* in due course, and in this manner the required lag is obtained. Upon continued rotation of the unit, the pawl 24*b* is returned into its initial or inactive position by the end of the lug 54, the position of the pawl in which this occurs being indicated in dotted lines in Fig. 1.

The parts of the rotary unit 23*a* and the stationary unit 23*c* are operated as described with reference to Figs. 4 and 5 when the operator moves the lever 41 into contact with the wire 39*c* as shown in dotted lines in Fig. 1, energizing the electromagnet 37*a* and advancing the pawl 24*a* which thereupon operates a double-armed lever similar to the lever 45, but, if desired, a single lever may be provided to be operated by both pawls 24*a* and 24*b* to close the contact 44. The lever 45 (or the levers) is so arranged with respect to the disc 23*b* that the contact 44 is closed a short time after the blade 1 has performed one of its operations. Intermediate the operations described and the operation of the switch 41, the discs 23*a* and 23*b* have performed more than a single revolution but less than two revolutions, and the web 18 has been fed forward until the defective sheet has arrived in proper position at the cutting station.

The object of duplicating the units is to enable the operator to handle two bad sheets which accidentally follow each other immediately which handling would not be practicable with a single unit. Under normal conditions, with a few defects distributed at considerable distances along the web the operator may throw the switch 41 as he desires, that is, to the wire 39*c* or to the wire 39*d*, but in the case of two bad sheets in immediate sequence the switch must be reversed so as to operate the opposite pair of units.

It is not necessary that the operator's switch 41 should be returned to its neutral position as shown by the vertical dotted lines in Fig. 1 immediately after it has been operated as the electromagnet 36*a* or 36*b* which attracts the plate 35*a* or 35*b* so as to withdraw the slide 32*a* or 32*b*, is energized independently of the operator's switch 41 by the contact spring 43*a* or 43*b* as described but the operator's switch must be returned to neutral position, or reversed, before the rear end of a defective sheet has moved past the point II, Fig. 1.

It will be understood that by the lagging operation described the work of the operator is much facilitated as he is able to throw in the switch 41 immediately he notices a defect, and need not follow the sheet through the machine.

My invention may also be applied to machines in which the "good" and "bad" piles are not superimposed as described but juxtaposed. In this case, a gripper mechanism is provided instead of a switch and operated by adjustable abutments and it is obvious that these abutments may be set in the manner described without departing from my invention.

Generally speaking, I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:—

1. Sorting device for sheet cutting machines comprising a cutter, means for feeding sheets past said cutter, a switch for conducting the sheets to separate piles according to their quality, mechanism for operating said switch, means for locking said switch against operation, a rotary member, a pawl on said member adapted to control said locking means, a circuit connected with said member, means on said member and in said circuit for operating said pawl, manually operated means for making and breaking said circuit, and means for operating said member from said mechanism in such manner that the operation of said switch lags with respect to that of said cutter.

2. Sorting device for sheet cutting machines comprising a cutter, means for feeding sheets past said cutter, a switch for conducting the sheets to separate piles according

to their quality, mechanism for operating said switch, means for locking said switch against operation, a rotary member, a pawl on said member adapted to control said locking means, a circuit connected with said member, an electromagnet on said member and in said circuit for controlling the position of the pawl with respect to said locking means, manually operated means for making and breaking said circuit, and means for operating said member from said mechanism in such manner that the operation of said switch lags with respect to that of said cutter.

3. Sorting device for sheet cutting machines comprising a cutter, means for feeding sheets past said cutter, a switch for conducting the sheets to separate piles according to their quality, mechanism for operating said switch, means for locking said switch against operation, a rotary member, a pawl on said member adapted to control said locking means, a circuit connected with said member, an electromagnet on said member and in said circuit for controlling the position of the pawl with respect to said locking means, a contact on said member operatively connected with said pawl for making and breaking said circuit as said member is rotating, manually operated means for making and breaking said circuit and means for operating said member from said mechanism in such manner that the operation of said switch lags with respect to that of said cutter.

4. Sorting device for sheet cutting machines comprising a cutter, means for feeding sheets past said cutter, a switch for conducting the sheets to separate piles according to their quality, mechanism for operating said switch, means for locking said switch against operation, a rotary member, a pawl, a circuit connected with said member, means on said member and in said circuit for operating said pawl, an auxiliary circuit, contacting means in said auxiliary circuit, adapted to be operated by said pawl so as to make and break said auxiliary circuit, an electromagnet in said auxiliary circuit operatively connected with said locking means, manually operated means for making and breaking said circuit, and means for operating said member from said mechanism in such manner that the operation of said switch lags with respect to that of said cutter.

5. Sorting device for sheet cutting machines comprising a cutter, means for feeding sheets past said cutter, a switch for conducting the sheets to separate piles according to their quality, mechanism for operating said switch, means for locking said switch against operation, a rotary member, a pair of electromagnets on said member, an armature adapted to be alternately attracted by said electromagnets, a circuit connected with said electromagnets, a pawl operatively connected with said armature so as to be reciprocated in said member as said armature is alternately attracted by said electromagnets, a contact on said member operatively connected with said pawl for making and breaking said circuit as said member is rotated, an auxiliary circuit, contacting means in said auxiliary circuit, adapted to be operated by said pawl so as to make and break said auxiliary circuit, an electromagnet in said auxiliary circuit operatively connected with said locking means, manually operated means for making and breaking said circuit, and means for operating said member from said mechanism in such manner that the operation of said switch lags with respect to that of said cutter.

In testimony whereof I affix my signature.

GEORG SPIESS.