

Dec. 31, 1940.

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2,227,202

SHEET TURNING MECHANISM

Filed Sept. 19, 1940

3 Sheets-Sheet 1

Fig. 1.

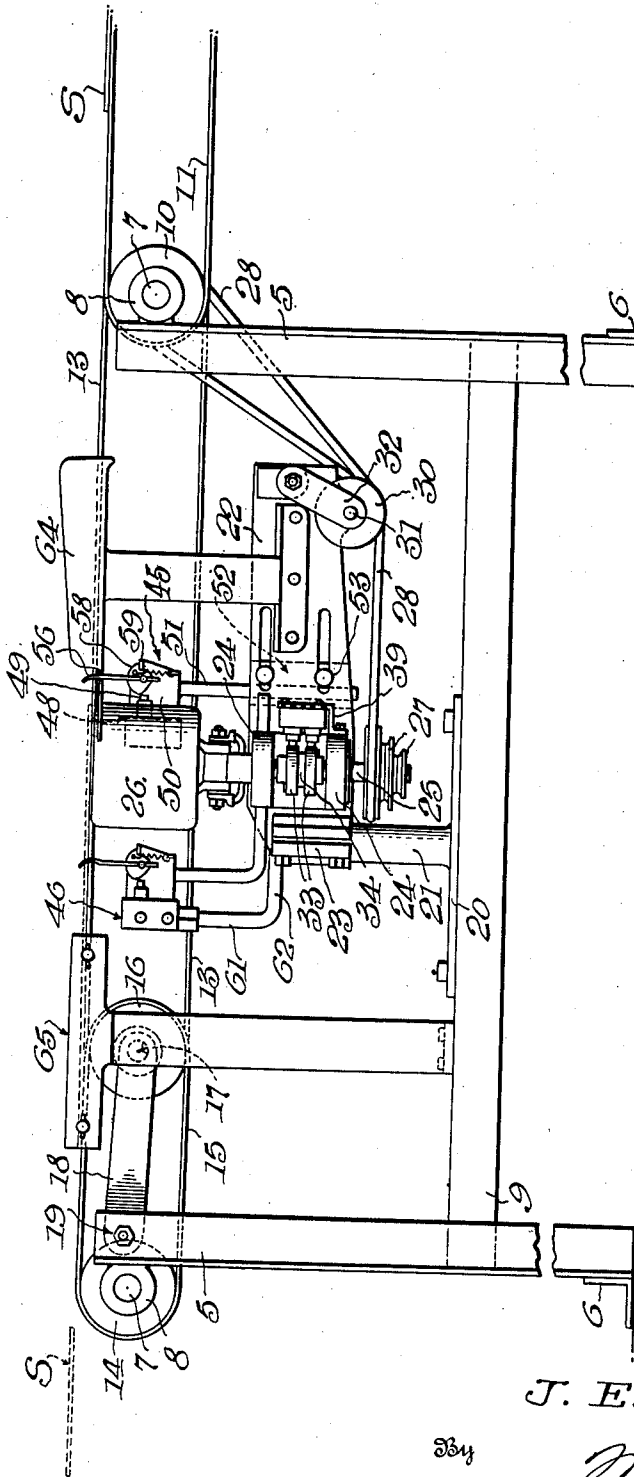
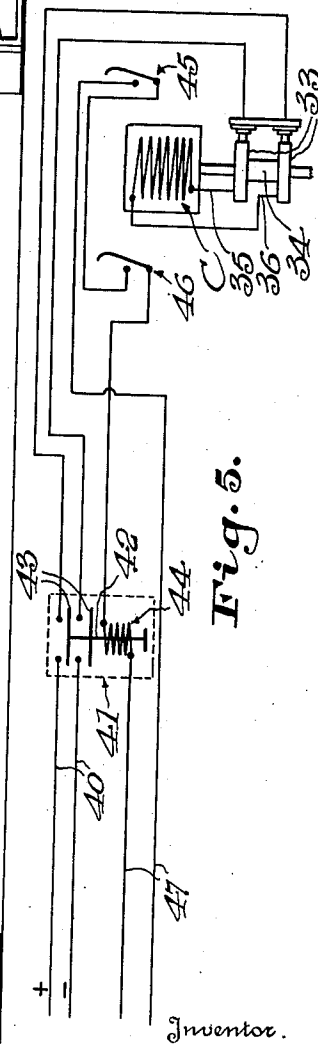


Fig. 5.



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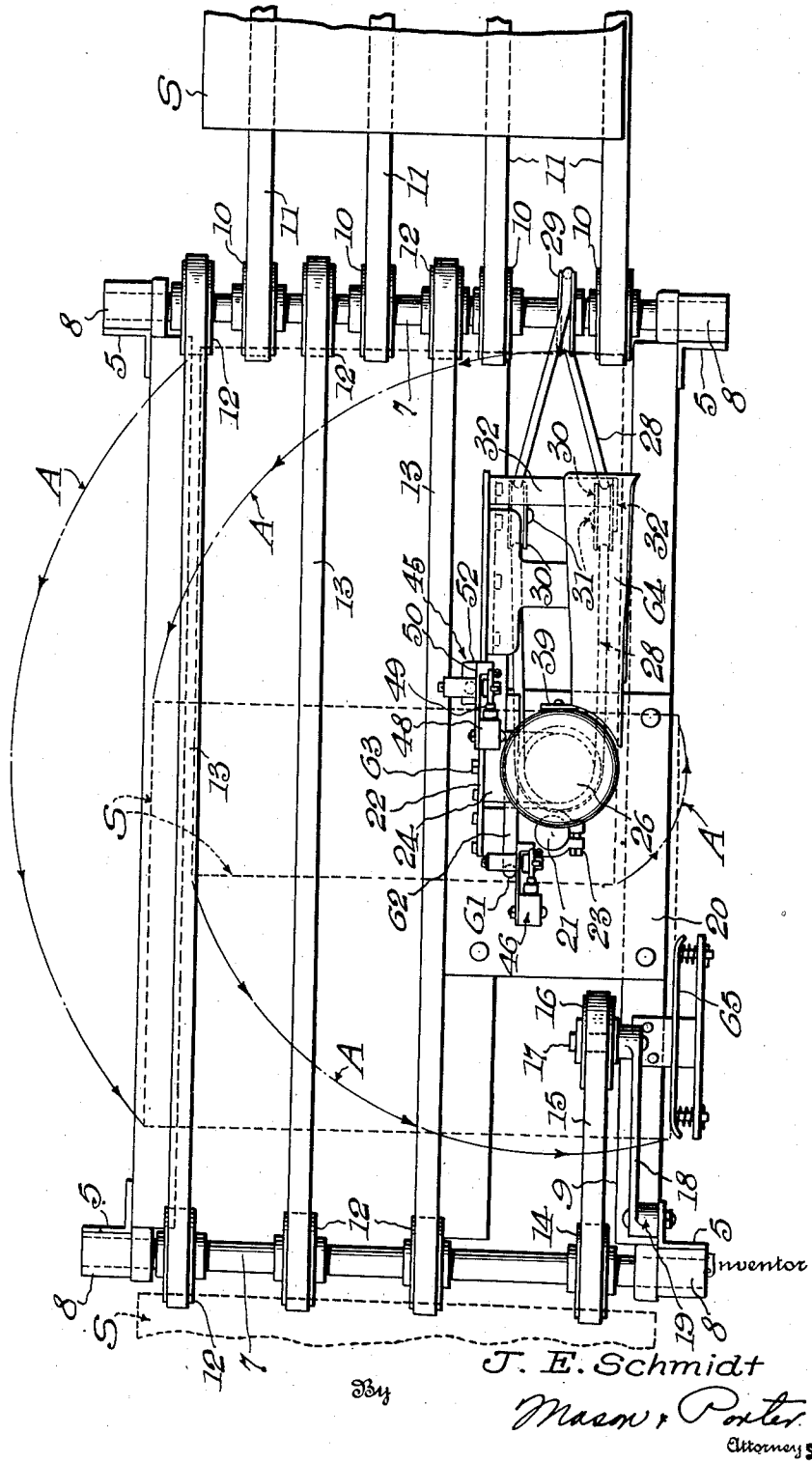
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3 Sheets-Sheet 2

Fig. 2.



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3 Sheets-Sheet 3

Fig. 3.

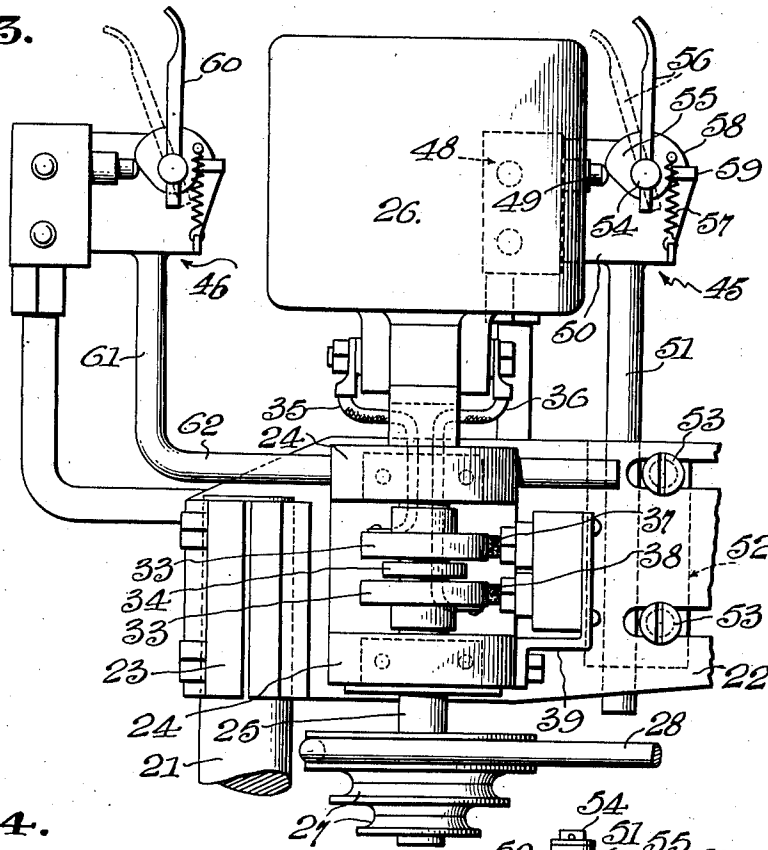
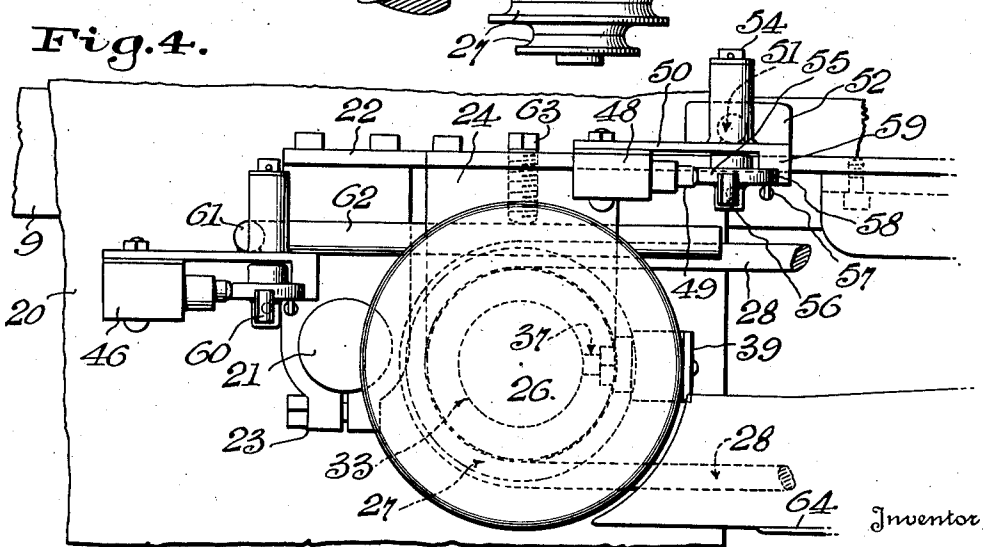


Fig. 4.



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UNITED STATES PATENT OFFICE

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SHEET TURNING MECHANISM

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3 Claims. (Cl. 271-49)

The invention relates generally to sheet turning mechanisms and primarily seeks to provide a novel magnetically operated sheet turning mechanism.

5 Mechanical sheet turning mechanisms have heretofore been provided for turning sheets in a horizontal plane as they are moving along from one unit of mechanism to another, such as from a sheet coating machine to a sheet drying oven, but such mechanisms have been found objectionable for various reasons, such as difficulty of control and the possibility of marring the sheets or the protective coating usually present thereon.

10 In its more detailed nature the invention resides in the provision of a sheet turning mechanism including a rotary head positioned so that the upper surface thereof is just below the plane of movement of the sheets-to-be-turned, and means for automatically energizing a magnetic coil within the head so as to at the proper time magnetize the head and cause it to magnetically attract and impart the desired amount of turning movement to the sheet so as to properly alter its position in the horizontal plane along which it is being fed.

Another object of the invention is to provide a magnetic head of the character stated which is constantly rotated, and control mechanism for properly energizing the magnetic coil within the head and including a pair of switch actuating levers engageable by the sheets-to-be-turned and effective to close a magnetic head energizing circuit only when both such levers are engaged by a sheet to be turned.

Another object of the invention is to provide a magnetic sheet turning mechanism of the character stated in which the control switches actuated by the sheet engaged levers or members are connected in series in a power supply line in which is included a relay for controlling the flow of energizing current to the coil of the magnetic head, and in which the actuating levers or members are so positioned that both must be engaged by an incoming sheet-to-be-turned in order to effect an energization of the head coil, one said lever being disposed to automatically break the coil energizing circuit when each sheet has been turned the desired amount.

Another object of the invention is to provide a mechanism of the character stated including means for suitably guiding the sheets to be turned to the magnetic head or rotor, and means yieldably engaged by an edge portion of a sheet

being turned to prevent excessive turning of said sheet.

With these and other objects in view which will more fully appear, the nature of the invention will be more clearly understood by following the description, the appended claims, and the several views illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a side elevation illustrating the improved sheet turning mechanism.

Figure 2 is a plan view of the parts illustrated in Figure 1.

Figure 3 is an enlarged fragmentary side elevation illustrating the sheet turning head or rotor and the associated, sheet-engaged control levers.

Figure 4 is a plan view of the parts shown in Figure 3.

Figure 5 is a diagrammatic view illustrating the wiring connections of the control levers and the magnetic coil of the rotor with the direct and alternating current supply lines.

While reference is herein made to the feeding of sheets from a coating machine to a drying oven, it is to be understood that the sheet turning mechanism herein disclosed can be utilized in turning sheets in the horizontal plane as they are fed from one mechanism to another regardless of the character of such mechanisms. It will also be observed that in the disclosure herein made, control mechanisms are set so as to effect a quarter or 90° turn of each sheet in a horizontal plane. It is to be understood, however, that the herein disclosed mechanism can be employed for imparting turns of different degrees without departing from the scope of the invention. It will later appear obvious also that the control devices can be adjusted for controlling the turning of sheets of different sizes.

In the example of embodiment of the invention herein disclosed there is included a frame consisting of corner uprights 5 spaced at their lower ends by transverse angles 6 and at the top by cross shafts 7 which are supported at their ends in suitable bearings 8 secured to the uprights, and intermediate horizontal frame angles 9.

The shaft 7 disposed at the advance or receiving end of the frame carries pulleys 10 over which the delivery ends of feeder belts 11 pass. It is to be understood that the belts 11 deliver the plates to be turned from any mechanism, such as a sheet coating machine. See Figures 1 and 2 of the drawings.

On both of the shafts 7 pulleys 12 are mounted, and feeder belts 13 pass over the pulleys 12 and serve to feed sheets-to-be-turned to and from the turning mechanism per se which will soon be described.

The shaft 7 at the delivery end of the framing also carries a pulley 14, and a short belt 15 passes over the pulley 14 and over an idler pulley 16 mounted on a stub shaft 17 carried at the free end of an arm 18 pivotally-adjustably mounted as at 19 on the machine framing so that the receiving end of the belt 15 can be adjusted vertically in order to properly intercept the corner of a sheet being turned. See Figures 1 and 2 of the drawings.

The turning mechanism proper includes a mounting plate 20 which carries a vertically projected standard 21 on which a bracket plate 22 is supported, said plate being removably clamped to the standard as at 23.

The plate 22 supports upper and lower bearings 24 in which a shaft 25 is rotatably mounted. At its upper end, the shaft 25 supports a magnet head or rotor 26, the upper end of which is disposed in a plane immediately below that in which the sheets-to-be-turned, are fed in the manner best illustrated in Figure 1 of the drawings. At its lower end the shaft 25 carries a set of selective drive pulleys 27.

Rotation is imparted to the shaft 25 and the magnet head or rotor 26 by a twisted belt 28 which passes over a driver pulley 29 mounted on the advance shaft 7, under idler pulleys 30 rotatably mounted on stub shafts 31 supported at 32 on the bracket plate 22, and over a selected one of the pulleys 27 secured at the lower end of the rotor shaft 25.

The shaft 25 also carries a pair of slip rings 33 which are electrically isolated by suitable insulation 34 and are connected as at 35 and 36 with the respective ends of the magnetic coil C within the head 26.

The slip rings 33 are engaged by contact brushes 37 and 38 stationarily supported upon a bracket 39 preferably secured to the lowermost one of the shaft bearings 24. The brushes 37 and 38 are respectively connected with 125 volt direct current supply lines 40 in the manner diagrammatically illustrated in Figure 5 of the drawings.

Flow of direct current through the lines 40 is controlled by a relay switch generally designated 41 and which includes a reciprocable core piece 42 carrying contact making and breaking heads 43 and which is disposed axially within a coil 44 connected at its respective ends through control switch mechanisms generally designated 45 and 46 in series in 110 volt alternating current supply lines 47. See Figure 5 of the drawings.

The control switch equipment generally designated 45 includes a normally open contact switch unit 48 which is adapted to be closed upon application of pressure against the circuit making and breaking button 49. The switch unit 48 is mounted upon a supporting bracket 50 including a standard 51 supported in a mounting member 52 which is horizontally adjustable as at 53 on the bracket plate 22. A rock shaft 54 is rockably mounted in the bracket 50 and carries a cam 55 engageable with the switch button 49 each time the control lever 56 which projects from the shaft 54 is moved by an incoming sheet-to-be-turned from the position illustrated in full lines in Figure 3 of the drawings to the position illustrated

in dotted lines in said figure. A return spring 57 serves to yieldably hold the cam stop portion 58 against the bracket stop 59 thereby to normally hold the lever 56 in the normal, sheet intercepting position illustrated in full lines in Figure 3.

The switch equipment generally designated 46 is identical with that generally designated 45 but its control lever 60 has its mounting standard 61 provided with a horizontally bent portion 62 which is slidable in the uppermost one of the bearing members 25, selected adjustments of said standard portion 61 being effected by manipulation of the clamp screw 63.

A stationarily supported sheet edge guide 64 serves to guide incoming sheets into suitable position over the turning head 26 and, if desired, a yieldably mounted edge abutment member 65 may be provided for engaging an edge portion of each sheet at the end of the intended turning movement thereof so as to prevent undesirable excessive turning of the sheet under momentum.

It will be observed that the control lever 56 is disposed slightly in advance of the turning head 26 and that the control lever 60 is disposed slightly beyond said head. It will be obvious by reference to Figures 2 and 5 of the drawings that as each sheet designated S is fed over the belts 11 onto the feeder belts 13 they will first contact the control lever 56 and move it from the position illustrated in full lines in Figure 3 to the dotted line position in that figure, thereby pressing inwardly on the switch button 49 and closing the switch generally designated 45. Since the switch equipments generally designated 45 and 46 are connected in series with the coil 44 in the alternating current supply line 47, the circuit is not completed through the coil 44 by closing of the single switch equipment 45, and until the incoming sheet also engages and displaces the switch lever 60 in the manner illustrated in dotted lines in Figure 3 the switch equipment 46 will remain open and the coil 44 will not be energized. It should be obvious that at this time the magnetic head or rotor 26 is turning beneath the sheet-to-be-turned but the magnetic coil C therein is not energized and the rotating head does not contact or attract the sheet overlying it.

The instant both of the control levers 56 and 60 are moved to the dotted line positions illustrated in Figure 3, circuit through the coil 44 will be completed and the core 42 of the relay 41 is projected to close the circuit through the direct current supply lines 40 and through the brushes 37, 38, slip rings 33, and connectors 35, 36 to energize the coil C within the magnetic head or rotor 26. When the coil C is energized the corner of the sheet overlying the head 26 will be attracted to the head and the sheet will be turned in the manner indicated by the arrows A on Figure 2 through a quarter turn so as to present one of the long edges of the sheet forwardly instead of one of the short edges as will be obvious by reference to said Figure 2. Because of the cooperative relation of the control levers 56 and 60, as hereinbefore described, the trailing edge of the turned sheet will pass out of contact with the first engaged lever 56 just as the sheet reaches the quarter turn position. As this lever 56 is released, the spring 57 returns it to the full line position illustrated in Figure 3 thereby breaking the circuit through the alternating current supply lines 47. It will be obvious that as soon as the circuit through the lines 47 is broken the coil 44 will be de-energized and the supply of direct cur-

rent through the power lines 40 to the magnetic head coil C will be broken and the turned sheet will no longer be attracted to the turning head 26.

As previously stated, the turning sheet may

- 5 engage a yieldable abutment 65 at the completion of its turning movement and just as the magnetic head coil C is de-energized so as to prevent undesired excessive turning of said sheet.
- 10 By utilizing the switch unit standard adjustments 53 and 53 the spaced relation of the switch units and their relation with the head or rotor 26 can be suitably altered to perfectly time the turning function and to adapt the mechanism
- 15 for the turning of sheets of various sizes.

- By reason of the provision of the short belt 15 and the adjustable positioning of the advance end thereof in the manner best illustrated in Figures 1 and 2 of the drawings, scraping or cutting of feeder belt portions by the leading corner of the sheet being turned is avoided because the advance end of the short belt 15 can be lowered slightly below the plane on which the sheets are fed. This lowering of the receiving end of the
- 20 short belt 15 will prevent swinging contact of the turning sheet with the belt even though the corner of the sheet overlying said belt might deflect downwardly a slight bit.

- The sheet turning mechanism herein disclosed
- 30 is preferably used in automatically turning sheets of lacquered, varnished, or enameled tin plate or black iron, horizontally through 90°, from a coating machine to a drying oven so that the rectangular sheets will better fit the opening of the drying oven. The turning head 26 is disposed slightly below the plane in which the sheets are fed and does not engage the sheets in scraping contact, and since this head magnetically attracts the lower dry surface of the coated
- 35 sheets no marring of the sheets or the coating thereon is occasioned.

- The improved sheet turner is adapted to use in the turning of sheets of various sizes and shapes with little or no adjustment. By using
- 45 alternating current in the supply lines 47 connected with the switch equipments generally designated 45 and 46, the contact points of the switches of these equipments may be adjusted very close to prevent burning or corroding and
- 50 thus assure long wear.

- By suitably adjusting the elevation and spaced relation of the switch equipments generally designated 45 and 46, the desired cooperative relation of these equipments, with each other, and
- 55 with the rotor 26, can be attained.

- While the rotor head 26 is illustrated as driven by belt and pulley connections from the feeder shaft 7 in this particular illustration, it should be understood that a small motor could be used
- 60 for driving this head so that the unit mounted upon the base 20 could be readily transferred from one machine to another if desired.

- It is of course to be understood that the details of structure and arrangement of parts may be variously changed and modified without departing from the spirit and scope of my invention.
- 65

I claim:

1. In a sheet turning apparatus, a turning
- 70 head movable about a vertical axis, means for feeding sheets-to-be-turned over and in close proximity with said head, means for continuously rotating said head, magnetic means carried by said head, and means for rendering said mag-
- 75 netic means effective each time a sheet-to-be-

turned comes into position over said head to attract said sheet against said head to be turned thereby.

2. In a sheet turning apparatus, a turning head movable about a vertical axis, means for 5 feeding sheets-to-be-turned over and in close proximity with said head, means for continuously rotating said head, magnetic means carried by said head, and means for rendering said magnetic means effective each time a sheet-to- 10 be-turned comes into position over said head to attract said sheet against said head to be turned thereby, said sheet feeding means including a rotary shaft having pulley equipment thereon and feeder belting passing over said pulley equip-
- 15 ment, and said head rotating means including belt and pulley transmission connections between said head and said shaft.

3. In a sheet turning apparatus, a turning head movable about a vertical axis, means for 20 feeding sheets-to-be-turned over and in close proximity with said head, means for continuously rotating said head, magnetic means carried by said head, and means actuated by movement of a sheet-to-be-turned for rendering said magnetic 25 means effective each time a sheet-to-be-turned comes into position over said head to attract said sheet against said head to be turned thereby.

4. In a sheet turning apparatus, a turning head movable about a vertical axis, means for 30 feeding sheets-to-be-turned over and in close proximity with said head, means for continuously rotating said head, magnetic means carried by said head, and means for rendering said magnetic means effective each time a sheet-to- 35 be-turned comes into position over said head to attract said sheet against said head to be turned thereby, said last named means including an electrical control circuit and a pair of electrical circuit controlling switch levers connected in series in said circuit and disposed for being suc-
- 40 cessively engaged by a sheet-to-be turned for completing the control circuit and for having one thereof disengaged by said sheet after it has turned the desired amount in order to break said circuit.
- 45

5. In a sheet turning apparatus, a turning head movable about a vertical axis, means for 50 feeding sheets-to-be-turned over and in close proximity with said head, means for continuously rotating said head, magnetic means carried by said head, and means for rendering said magnetic means effective each time a sheet-to-be- 55 turned comes into position over said head to attract said sheet against said head to be turned thereby, said last named means including an electrical control circuit and a pair of electrical circuit controlling switch levers connected in series in said circuit and disposed in spaced relation in the direction of feed-in movement of the sheets for being successively engaged by a sheet-to-be-turned for completing the control circuit and for having one thereof disengaged by said sheet after it has turned the desired amount in order to break said circuit and means for ad-
- 60 justing the spaced relation of said levers.
- 65

6. In sheet turning apparatus, sheet feeding means, a rotary head disposed to have sheets-to-be-turned fed thereover in close proximity and having sheet attracting magnetic means 70 thereon and adapted to be intermittently energized and deenergized, and means for energizing and deenergizing said magnetic means including a current supply line electrically connected with said magnetic means and a circuit 75

making and breaking switch means engageable by a sheet-to-be-turned for completing the energizing circuit to effect an attraction of the sheet to the head and a turning of the sheet by said head and disengageable by said sheet for breaking said circuit after completion of a predetermined degree of turning movement thereof.

7. In sheet turning apparatus, sheet feeding means, a rotary head disposed to have sheets-to-be-turned fed thereover in close proximity and having sheet attracting magnetic means thereon and adapted to be intermittently energized and deenergized, and means for energizing and deenergizing said magnetic means including a direct current supply line electrically connected with said magnetic means, a relay for making and breaking circuit through said supply line, an alternating current supply line connected with said relay, and a circuit making and breaking switch means connected in said alternating current supply line and engageable by a sheet-to-be-turned for completing the alternating current circuit and energizing said relay for completing the direct current line and energizing said magnetic means to effect an attraction of the sheet to the head and a turning of the head by said sheet and disengageable by said sheet for breaking said direct current line and deenergizing said magnetic means after completion of a predetermined degree of turning movement of said sheet.

8. In sheet turning apparatus, sheet feeding

means, a rotary head disposed to have sheets-to-be-turned fed thereover in close proximity and having sheet attracting magnetic means thereon and adapted to be intermittently energized and deenergized, and means for energizing and deenergizing said magnetic means including a direct current supply line electrically connected with said magnetic means, a relay for making and breaking circuit through said supply line, an alternating current supply line connected with said relay, and a circuit making and breaking switch means connected in said alternating current supply line and engageable by a sheet-to-be-turned for completing the alternating current circuit and energizing said relay for completing the direct current line and energizing said magnetic means to effect an attraction of the sheet to the head and a turning of the head by said sheet and disengageable by said sheet for breaking said direct current line and deenergizing said magnetic means after completion of a predetermined degree of turning movement of said sheet, said last named switch means including a pair of circuit controlling switch levers connected in series in said alternating current line and disposed in spaced relation for lying successively engaged by a sheet-to-be-turned for completing the alternating current circuit and for having one thereof disengaged by said sheet after it has turned the desired amount in order to break said alternating current circuit.

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