

April 20, 1926.

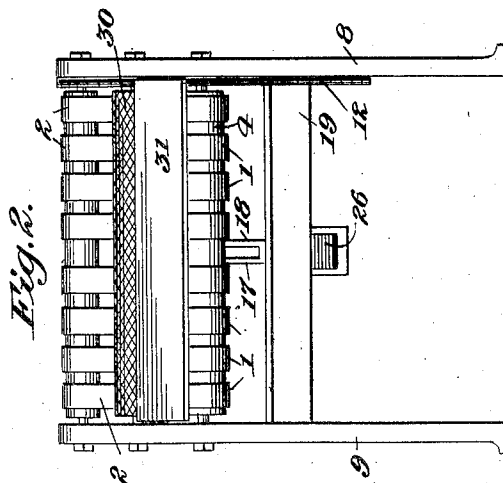
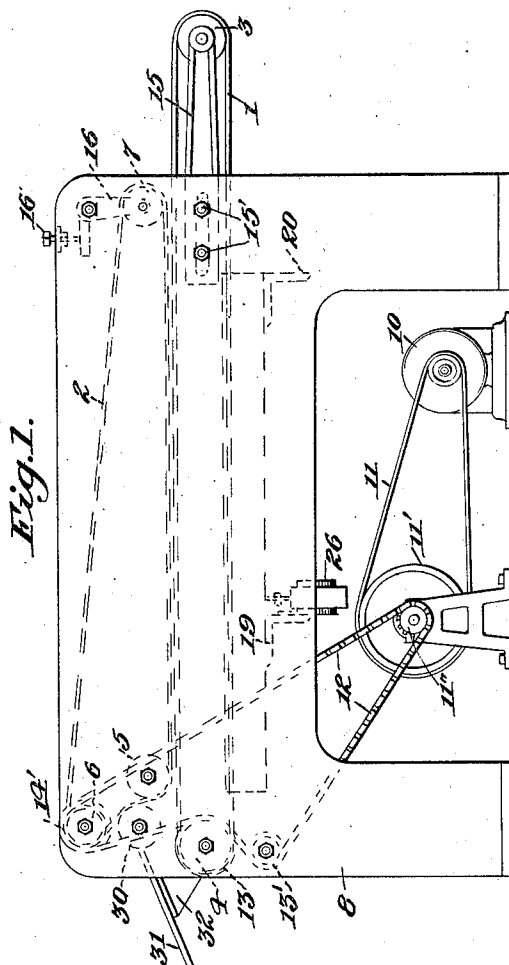
1,581,677

C. V. CARNOVSKY

SHEET FOLDING MECHANISM

Filed Sept. 12, 1924

4 Sheets-Sheet 1



Inventor:
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April 20, 1926.

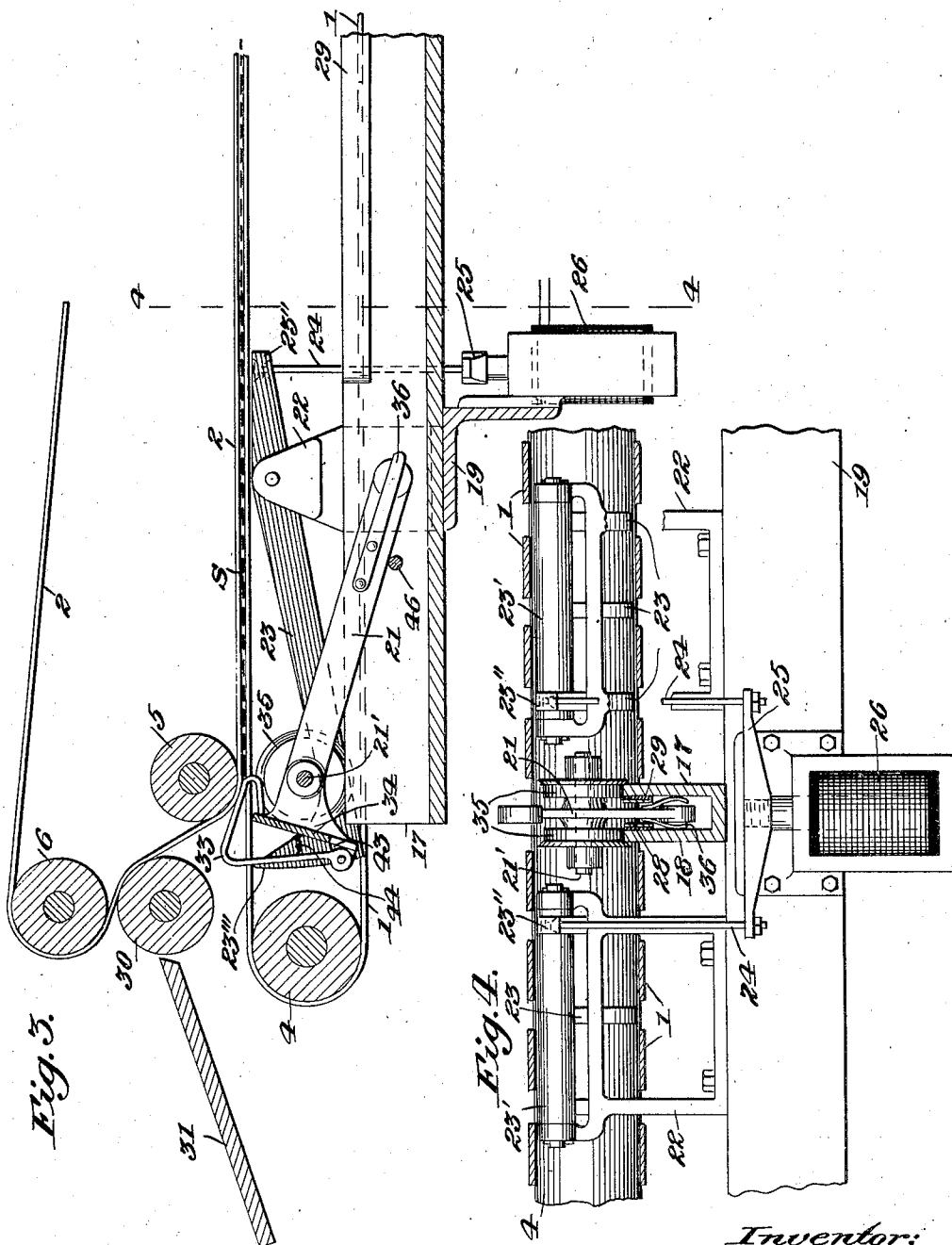
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SHEET FOLDING MECHANISM

Filed Sept. 12, 1924

4 Sheets-Sheet 2



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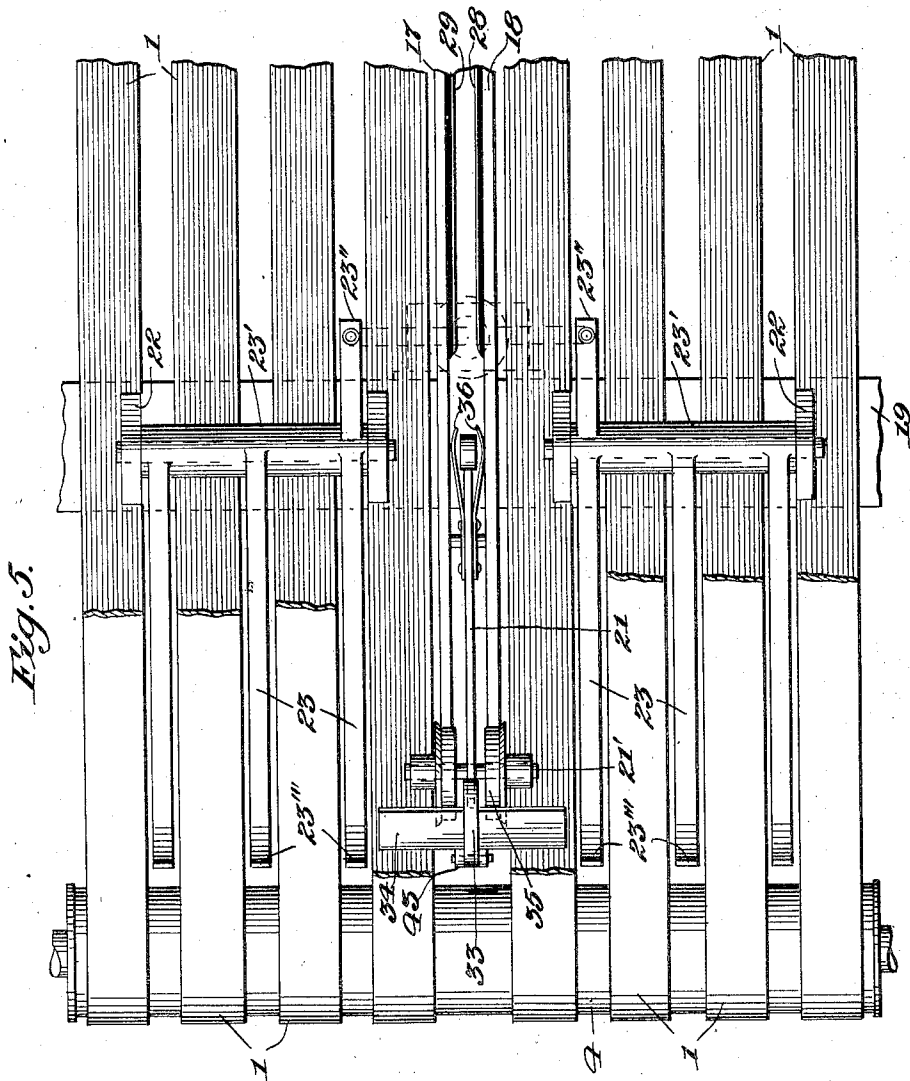
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SHEET FOLDING MECHANISM

Filed Sept. 12, 1924

4 Sheets-Sheet 3



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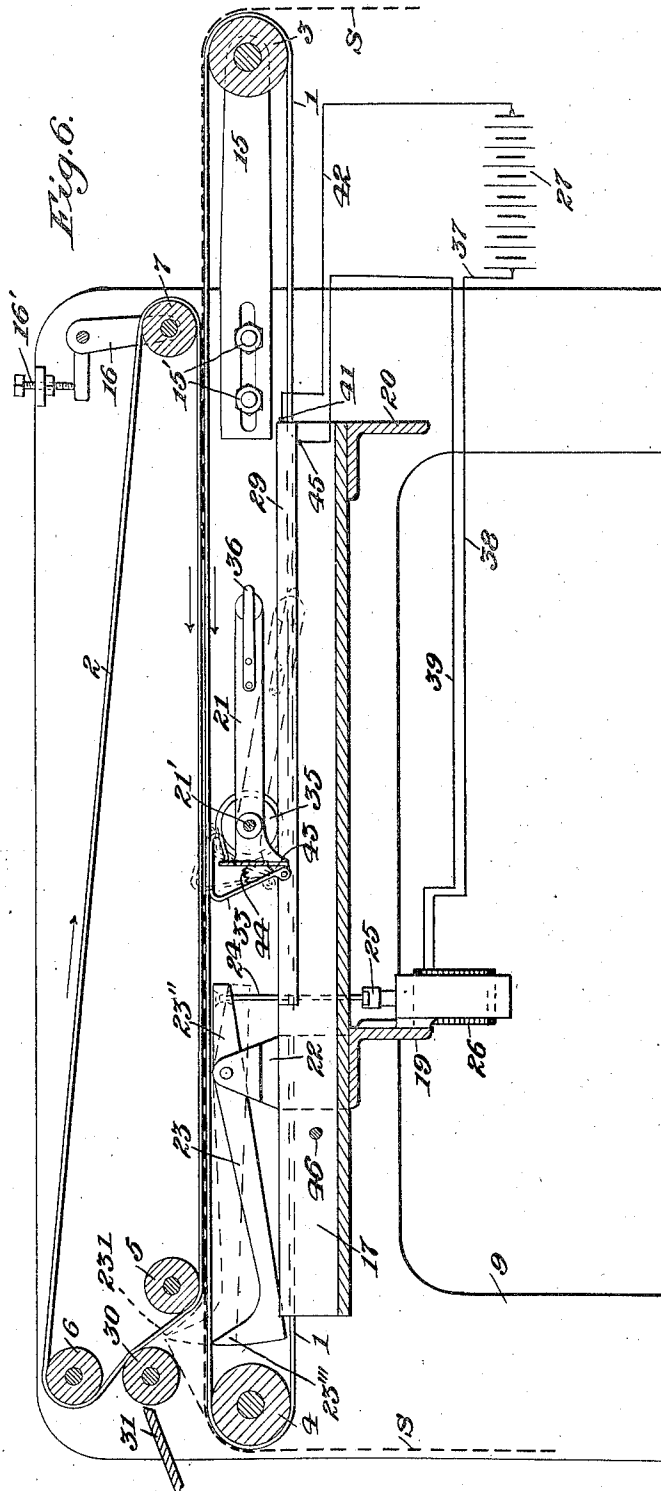
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C. V. CARNOVSKY

SHEET FOLDING MECHANISM

Filed Sept. 12, 1924

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

CHARLES VERNON CARNOVSKY, OF ST. ALBANS, VERMONT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO GREAT EASTERN LAUNDRY MACHINERY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SHEET-FOLDING MECHANISM.

Application filed September 12, 1924. Serial No. 737,330.

To all whom it may concern:

Be it known that I, CHARLES VERNON CARNOVSKY, a citizen of the United States, residing at St. Albans, in the county of Franklin, State of Vermont, have invented certain new and useful Improvements in Sheet-Folding Mechanism, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

My invention relates to sheet folding mechanism.

The object of the invention is to provide a simple and efficient machine for automatically folding sheets into half or any other predetermined ratio of the original length by causing the rear end of the sheet in passing through the machine to actuate the folding mechanism.

This object I accomplish by the construction shown in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved sheet folding machine;

Fig. 2 is a front end elevation of the same;

Fig. 3 is an enlarged longitudinal sectional elevation of the front end of the machine;

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged plan of the parts shown in Figures 3 and 4, and

Fig. 6 is an enlarged central longitudinal section through the entire machine.

The frame of the machine consists in the two sides 8 and 9 connected by angled cross bars 19 and 20. Front and rear rolls 4 and 3 are mounted in the sides of the frame; the rear roll 3 being carried by longitudinally slotted bars 15, 15 adjusted by means of set screws 15', 15', so as to give proper tension to the series of endless conveyor tapes 1, extending around said rolls. The upper conveyor member comprises a series of endless tapes 2 overlying the tapes 1 and passing around a rear roll 7 journaled in a bell crank tightener lever 16 provided with an adjusting screw 16'. The lower run of the tapes 2 passes under a front roll 5, thence upwardly around the front roll 6 and in contact with the rear face of an intermediate folder roll 30, the face of which is preferably roughened. The tapes are oper-

ated as follows:—A motor 10 through belt 11, drives the pulley 11' provided with a sprocket wheel 11" around which passes the chain 12. Chain 12 passes upwardly over sprocket 14 on roll 6, thence downwardly to the rear side of sprocket 13 on front roll 4 and over an idler 13'. As shown, this drives the working runs of tapes 1 and 2 at the same rate of speed and in the same direction. The above constitutes the endless sheet conveying mechanism and in front of the roll 30 is placed the sheet delivery board 31, mounted on the bracket 32.

The folder comprises two series of folder arms 23 connected at their inner ends by hubs 23' journaled in brackets 22 mounted on cross bar 19; each hub 23' having a rearwardly extending operating arm 23'', and all of the folder arms having upturned forward ends 23''' adapted at the proper time to fold the sheet S up between rolls 30 and 5 and the forward portions of tapes 2, so that tapes 2 and rolls 30 and 5 will fold the sheet and pass it in folded condition to the delivery board 31. The folder arms are mounted to swing up between the tapes 1 which are properly spaced for this purpose, and said arms are actuated by a solenoid 26, the core of which has a cross head 25 at its upper end connected to the operating arms 23'' by connecting rods 24. The front ends of the folder arms drop by gravity and are swung into action at predetermined times by the solenoid 26. Solenoid 26 is energized by battery 27 or other electrical source.

The above folding mechanism is actuated as stated by the solenoid 26 which forms part of the fold-actuating mechanism and is controlled by mechanism now to be described.

A pair of parallel rails 17, 18 are mounted longitudinally of and centrally between the sides 8 and 9, upon the two cross pieces 19, 20 and lie between the lower runs of tapes 1. The rails are provided with insulated contact strips 28, 29. A fold control and measuring arm 21, is mounted near its forward end on the axis 21' of a pair of wheels 35, 35 traveling on the rails 17, 18, and its rear heavier end is provided with a pair of connected contact springs 36 for engagement with the rail-contacts 28, 29. The front end of the controller arm 21 is provided with a

vertically disposed clutch-forming front plate 34, to ears 43 on the lower forward edge of which is pivoted the sheet actuated latch 33. This latch extends upwardly to about the level of the upper run of tapes 1 and is thence bent rearwardly over and down behind the upper edge of the plate 34, so as to form a stop to limit its forward throw. A spring 44 presses the latch forwardly away from plate 34 to allow the latch to yield in passing under roll 5.

The operation is as follows—In Fig. 6, the sheet S, is shown as hanging down at its middle over roll 4 and the folder arms 23, are depressed. The rear end of the sheet S is in the act of passing the latch 33 so that the circuit controller arm 21 will drop to the position shown in dotted lines, in doing which, the contacts 36 will engage the track contacts 28, 29 and so energize the solenoid 26 and cause its core to be depressed and so rock the folder arms 23 upwardly and cause the fingers 23'' thereof to lift the sheet to the position shown in dotted lines 231 (Fig. 6), where its fold will be grasped by the folder rolls 5, 30 and tapes 2, and the folded sheet fed to the discharge table 31. In so swinging down at the rear end, the forward end of arm 21 will swing up and the upper edge of its plate 34 will clutch the forward traveling upper run of tapes 1, since the latch 33, is no longer under the sheet S. The wheeled controller 21 will travel forwardly to the position shown in Fig. 3 and the folder arms 23 will have dropped down. The controller arm 21 will fall, see Fig. 3, till stopped by stop 46 and in this position the parts will remain until the front edge of another sheet S reaches the latch 33 and tilts plate 34 in the opposite direction which will bring its lower edge into clutching contact with the rearwardly traveling lower runs of tapes 2. Thus the wheeled controlling arm 21 will then travel rearwardly till it again reaches the position shown in Fig. 6, when the passage of the rear end of another sheet S will release it and cause its contacts 28, 29 to again energize the solenoid and cause arms 23 to lift the middle of the sheet to its folding position.

In thus dropping to the position shown in dotted lines in Fig. 6, the contacts 36 on the controller 21 will, as stated, engage the rail contacts 28, 29 and the current will travel from 37, 38 through solenoid 26 out at 39, 45 to rail contact 28, through spring contacts 36 and rail contact 29 at 41, 42 back to battery 27.

The term "latch" is used to describe the member 33, since it is released and acted upon by the sheet to be folded and is not intended as a limitation to any detailed construction.

The controller arm 21 is carried backward

always exactly half the length of the sheet that has passed over it, because both are traveling at the same speed though in opposite direction, and so acts as a measuring means. To obtain other than half folds, the controller mechanism 21 must be attached to other reverse running tapes of different speed.

Various changes may be made without departing from the spirit of my invention.

Having thus described the invention, what I claim as new and desire to secure by Letters-Patent, is—

1. A sheet folding mechanism comprising a sheet conveyor, folding mechanism at the delivery end thereof and a traveling fold controller and measurer, and means carried by said fold controller and actuated by the forward and rear ends of the sheet to be folded to cause the fold controls to be moved forward and backward by said conveyor.

2. A sheet folding mechanism comprising a sheet conveyor, a traveling fold controller and measurer, means controlled by the advancing end of the sheet to cause the movement of said controller in a direction opposite to the movement of the sheet, means controlled by the rear end of the sheet to arrest the rearward movement of said controller and to cause the return movement, a folding mechanism, and means actuated by the said controller at the completion of its rearward movement to effect the actuation of said folding mechanism.

3. A sheet folding mechanism comprising a sheet conveyor, folding mechanism at the delivery end thereof including electrically operated means for presenting a fold in the sheet to said folding mechanism, a traveling fold controller and measurer provided with contacts to close the energizing circuit of said electrically operated means, said controller being actuated by the forward and rear ends of the sheet to be folded, and adapted to close said circuit when released by the rear edge of the passing sheet.

4. In a sheet folding mechanism, an endless sheet conveyor, a traveling fold controller within said conveyor, a latch on said controller actuated by the sheet to be folded, upper and lower conveyor engaging surfaces on said controller actuated by said latch and adapted to alternately connect the controller with opposite runs of the conveyor, to shift it back and forth in measuring relation to the sheet to be folded, a folder mechanism at the delivery end of the conveyor, and folder arms to present the sheet, at the fold, to the folding mechanism, and means for controlling said folder arms from the traveling controller.

5. The combination in a sheet folding machine, with upper and lower series of endless conveyor tapes between which the sheet is fed and spaced folder rolls at opposite

ends of the forward end of the upper series of tapes, of a series of folder arms pivoted within the lower series of tapes and having fingers to project up between the upper runs of said lower tapes to lift the sheet to said folder rolls, electro-magnetic means for actuating said folder arms, fixed contacts in the circuit of said electro-magnetic means, a traveling circuit controller actuated alternately in opposite directions by the upper and lower runs of the lower series of tapes and provided with contacts to engage said fixed contacts and so energize the electro-magnetic means, and a device carried by the traveling circuit controller for effecting the operative connection of the said circuit controller with the said lower tapes.

6. The combination in a sheet folding machine, with an endless conveyor comprising two series of superposed endless tapes between which the sheet to be folded is fed, means at the forward ends of the tapes for folding the sheet, folder arms for lifting the sheet between its ends to said folding means from the endless conveyor, electro-magnetic means for actuating said folder arms, fixed contacts in the circuit of said electro-magnetic means, a pivoted circuit controlling arm having contacts at its rear longer arm to engage the said fixed contacts and complete the circuit to energize the said electro-magnetic device, guides or tracks within the lower series of tapes on which the controlling arm is mounted to travel back and forth, a front plate at the forward shorter end of the circuit controlling arm to engage with its upper and lower edges, the upper and lower runs of the lower series of conveyor tapes, and a sheet actuated latch carried by the forward end of said circuit controlling arm and extending into the sheet space between the upper and lower series of tapes.

7. A sheet folding machine comprising an endless conveyor, folding rolls at the delivery end thereof, folder arms to lift the sheet to the rolls for folding, an electro-magnetic actuator for said arms, fixed contacts in the circuit of said actuator, and a traveling circuit controller propelled in opposite directions by said conveyor and provided with contacts to engage said fixed contacts to energize the electro-magnetic actuator and a sheet actuated device carried by the traveling circuit controller for controlling the movements of the controller by the passage of a sheet.

8. A sheet folding mechanism comprising an endless sheet conveyor, folder rolls at the delivery end of said conveyor, sheet lifting mechanism adapted to lift the sheet at the fold to present it to the folder rolls, means for actuating said lifting mechanism, a sheet actuated traveling controlling mechanism for the said lifting mechanism, and

means for moving the said sheet actuated controller back and forth by said sheet conveyor.

9. A sheet folding mechanism comprising an endless conveyor, folder rolls at the delivery end thereof, vertically rocking folder arms to lift the passing sheet to the folder rolls, an electro-magnetic actuator operatively connected with said folder arms, longitudinal tracks lying within the conveyor and having fixed contacts in the circuit of the said electro-magnetic controller, a vertically rocking sheet controlled circuit controlling arm mounted to travel back and forth on said tracks and having contacts on its rear end to engage said fixed contacts in dropping and complete the electric circuit to the electro-magnetic controller, and a sheet actuated latch on the forward shorter end of said circuit controller arm to first throw the said shorter end into connection with the upper run of said conveyor to start the controller in its forward travel, and at the folding point, acting to throw said controller into engagement with the lower run of said conveyor to return it to the starting point where it tilts to complete the electric circuit.

10. A sheet folding mechanism comprising a conveyor formed of a series of endless traveling tapes, folder rolls at the forward or delivery end of said tapes, vertically swinging folder arms pivoted between their ends within the said conveyor and at their forward ends adapted to lift the sheet to the folder arms, a solenoid connected to the rear ends of said folder arms, a longitudinal track within said conveyor and having contact strips extending along their rear portion and in the solenoid circuit, a wheeled circuit controlling arm mounted between its ends on said track to swing vertically and having contacts on its longer rear end to engage said track strips and complete the circuit of said solenoid, a vertical tape engaging plate on the shorter front end of said arm to alternately engage with its upper and lower edges the upper and lower runs of said tapes, and a sheet controlled latch pivoted to the lower edge of said front plate and lying in the path of the sheet to be folded.

11. A sheet folding mechanism comprising an endless conveyor formed of parallel spaced tapes, folder rolls at the delivery end of said conveyor, vertically rocking folder arms pivoted within said conveyor and having upwardly extending fingers at their forward ends to lift the sheet from the tapes to the folder rolls, a solenoid connected to the rear ends of said folder arms to rock them upwardly, tracks lying centrally and longitudinally within the conveyor and provided in their rear portions with longitudinal contact strips in the circuit of the said solenoid,

wheels mounted on the tracks, a circuit controlling arm mounted to swing vertically on and travel with said wheels, contacts mounted on the sides of the longer member of said circuit controlling arm to complete the solenoid circuit in the downward movement of said longer member, a vertically disposed plate on the forward end of said circuit controlling arm and adapted to al-

ternately engage the upper and lower runs of said endless tapes, and a latch pivoted at its lower end to the lower forward portion of said front plate and extending upwardly beyond the upper runs of the tapes in the path of the sheet to be folded.

In testimony whereof, I affix my signature.

C. VERNON CARNOVSKY.