R. HITCHCOCK.

SHEET FEEDING MECHANISM.

APPLICATION FILED JULY 3, 1920.

1,419,733.

Patented June 13, 1922.

2 SHEETS—SHEET 1.

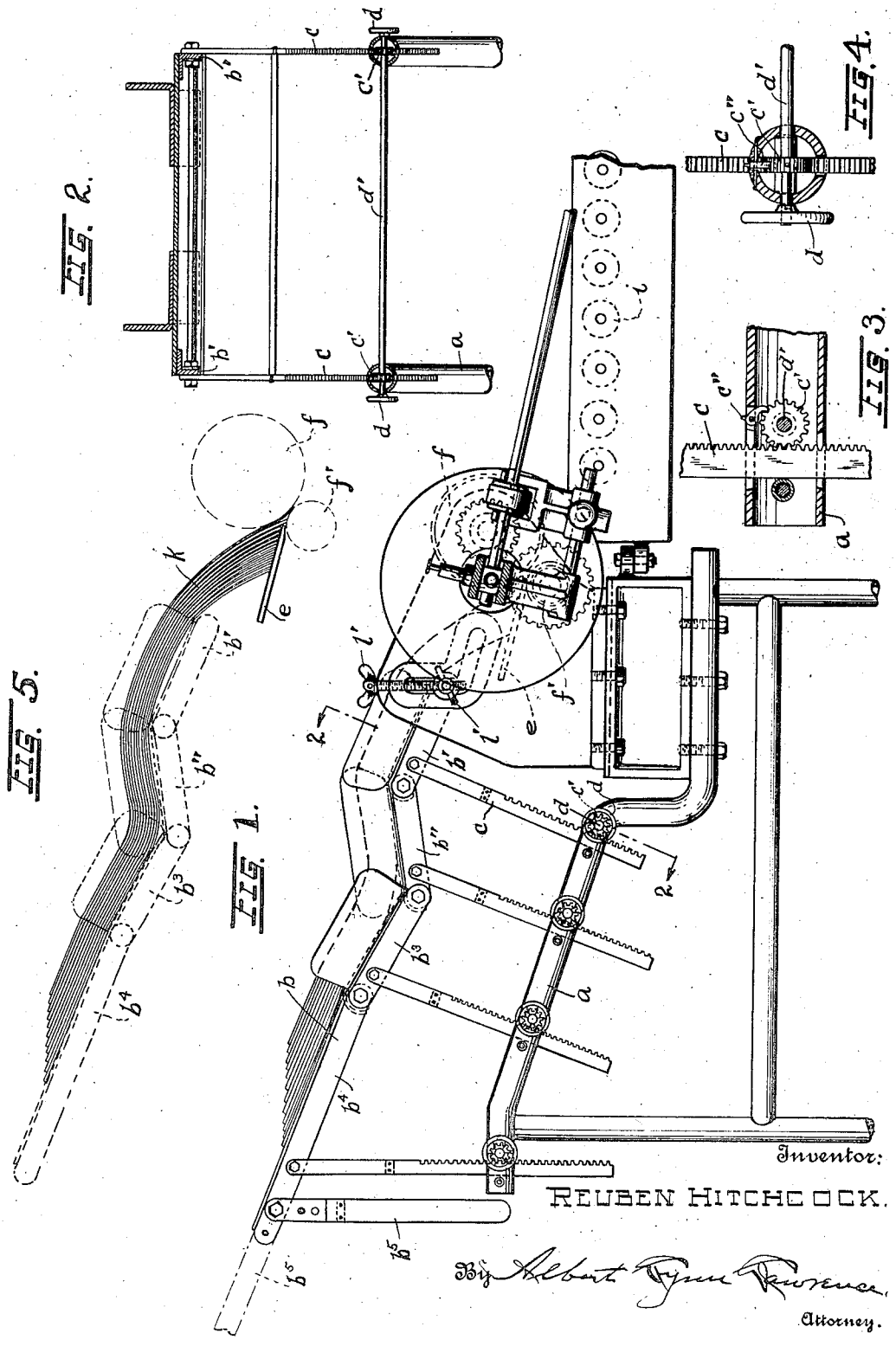


FIG. 1.

FIG. 2.

FIG. 4.

FIG. 3.

FIG. 5.

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2 SHEETS—SHEET 2.

FIG. 6.

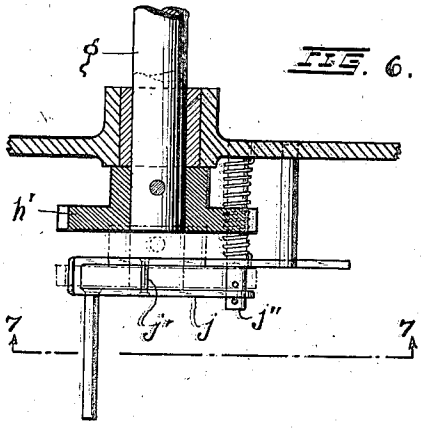
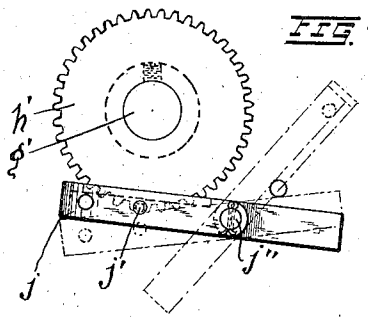


FIG. 7.



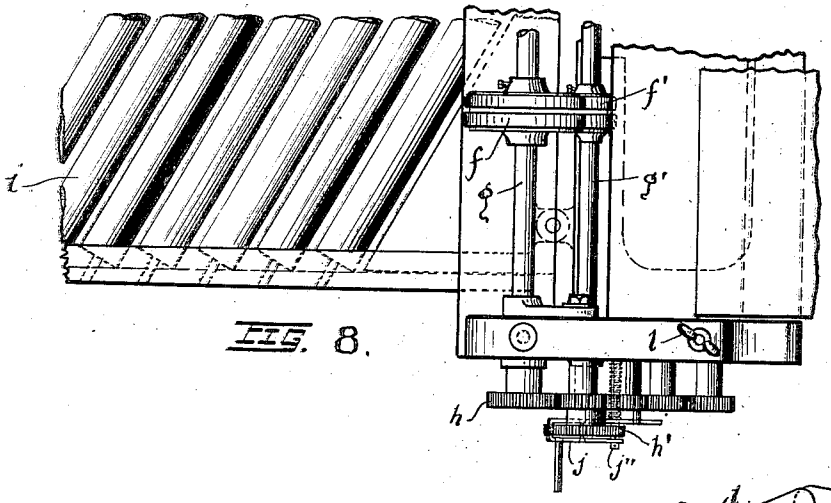
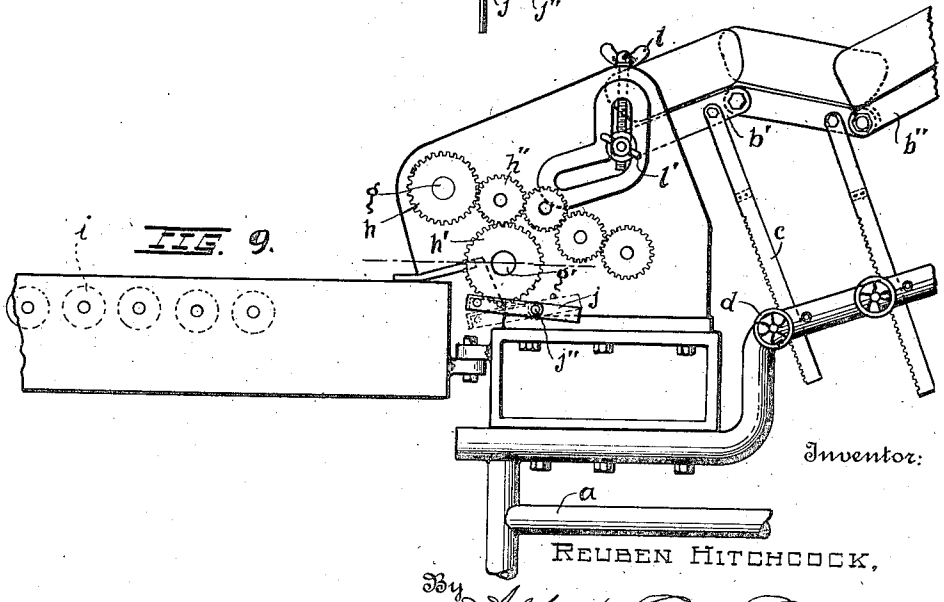


FIG. 8.

FIG. 9.



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UNITED STATES PATENT OFFICE.

REUBEN HITCHCOCK, OF CLEVELAND, OHIO, ASSIGNOR TO THE CLEVELAND FOLDING MACHINE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

SHEET-FEEDING MECHANISM.

1,419,733. Specification of Letters Patent. Patented June 13, 1922.

Application filed July 3, 1920. Serial No. 393,872.

To all whom it may concern:

Be it known that I, REUBEN HITCHCOCK, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Sheet-Feeding Mechanism, of which the following is a specification.

My invention relates to improvements in sheet-feeding mechanism and more particularly to the means for adjusting and presenting the sheets to the rotary feeding member or members, whereby they are individually fed to any suitable associated mechanism, such as a folding machine, printing press, pasting machine, and the like.

My improvements primarily are applicable to a machine depending upon two resiliently faced rolls or members, one or both of which may be rotated to impel the uppermost sheet of a stack and effect successively the individual feeding thereof, sheet by sheet.

It is found in practice that the action of such feeding rolls differs widely in operating upon various classes and sizes of paper stock, so that, upon changing from one job to another, the paper may stall or may be fed several sheets at a time.

Accordingly, I have devised certain improvements hereinafter explained, whereby the feeding action may be rendered dependable and accurate, through the proper positioning of the parts and the adjustment of the various members of the sheet-feeding mechanism. Thus I have provided an inclined supporting plate adjacent to the feeding rolls, whereon the edges of the sheets initially bear, and in association therewith I preferably employ an adjustable supporting table for the sheets which, in turn, is formed of individually adjustable sections.

The features of my said invention may be best explained by making reference to the accompanying drawings showing the preferred embodiment thereof, wherein:

Figure 1 is a view in side elevation, partially broken away, showing the sheet-feeding mechanism and a portion of an associated delivery table. Fig. 2 is a cross sectional view through the adjustable supporting table. Fig. 3 is a fragmentary view illustrating the adjusting rack and pinion in longitudinal section of the frame. Fig. 4 is a similar view thereof in cross section of the frame. Fig. 5 is a diagrammatic view setting forth the theory of operation. Fig. 6 is a fragmentary sectional view illustrating the means for locking the driving gear. Fig. 7 is a view in elevation showing the gear displaced and locked against rotation. Fig. 8 is a plan view of the driving train, feeding rolls and delivery table, in fragmentary showing thereof and Fig. 9 is a fragmentary view in side elevation illustrating the opposite side of the machine shown in Fig. 1.

Throughout the several figures of the drawings I have employed the same character of reference to indicate similar parts.

Referring first to Fig. 1, the frame a is seen to support a sectional and adjustable supporting table b, comprising some five transversely pivoted sections b', b'', b^3, b^4 and b^5. Each section is provided with corresponding racks and gears for effecting their adjustment, as racks c pivoted at their upper ends to the rear portion of a supporting table section, their actuating gears c' and associated pawls c''. A hand wheel d provided at each side of the frame at the ends of connecting shaft d', which also mounts the corresponding pinions c', affords ready means for adjusting the height of the associated table section.

Positioned in a lower adjacent plane with respect to the forward section b' is a transverse plate or separator e and immediately in front thereof are mounted the feeding rolls f, f'. These rolls, as best shown in Fig. 8, may be adjusted transversely of the machine upon their respective shafts g, g', to suit the character of work in hand and, particularly, the size of sheets being fed thereby.

These feeding rolls may be driven by the train of gears, h, h' and h'', Fig. 9, in opposite directions, or the lower roll may be held against rotation and thus employed as a resilient member, against which the upper roll operates to advance the sheets of paper to the delivery table, comprising the diagonally positioned set of horizontal rollers i.

Except when a glazed paper stock is being fed by the machine, it has been found desirable to employ only one rotated roll f for feeding the paper, while the lower roll is held against rotation by the means delineated in Fig. 7. The shaft g' has the alterna-

tive positions of Fig. 6, when it is in engagement by means of its gear h' with the driving train for reversely rotating the roll f', or of Figs. 7 and 8, when a tooth of said gear h' is engaged by the detent j' of the arm j which is spring-actuated on its pivoting stud j''. By referring to Fig. 8, it is seen that the shaft g' has been laterally actuated sufficiently to disengage the gear h' from its driving train. Under these circumstances, the lower roll must remain stationary, but it may be rotated manually as the adhesive rubber faces thereon are subject to wear, so that a new portion of the roll may be brought into position for use, from time to time. Both of the feeding rolls are provided with these slightly adhesive faces of soft rubber, which may be renewed from time to time, and on which the mechanism depends for advancing the sheets one at a time from the supporting table to the delivery table.

Turning now to Fig. 5, the theory and advantages of operation of my improved feeding mechanism may now be briefly explained. This figure of the drawings is intended as a diagrammatic representation of the essential portions of the device in the course of feeding a stack of paper stock k, sheet by sheet, to some associated mechanism not shown in the figure, but understood to be at the right of the circles f, f' indicating the feeding rolls.

First, it will be observed that the sections of the supporting table are so adjusted as to afford a break in the length of the supported sheets, about midway thereof. The front edges of the sheets are fanned out so that they partly hang from the forward edge of the front section b' and rest upon the inclined plate e with their forward edges slightly displaced and the topmost sheet positioned to enter between the feeding rolls. The supporting table, as a whole, is sufficiently inclined to cause the sheets, if otherwise unsupported, to have a tendency to slide downward. This tendency obviously would cause the sheets to feed through the rolls a plurality at a time, or even to stall the machine, unless suitable provisions were made to avoid the same.

Thus the inclined plate e affords a drop for the forward portions of the sheets on which the edges are fanned out and supported against this sliding tendency sufficiently to counteract all but the pressure necessary to engage the topmost sheet with the feeding roll or rolls and enter it therebetween. The upper roll f is rotated in a counter-clockwise direction, while the lower roll f' ordinarily is maintained against rotation, but, with certain classes of paper stock, it may be rotated in a reverse direction to assist in separately feeding the sheets.

The construction shown permits the forward edge of the supporting table to be adjusted with respect to the frame, the plate e and the rolls f, f'. This is effected by means of the screws l, l', as shown in Figs. 1 and 9, so that the proper inclination and terminal drop of the sheets may be carefully regulated in accordance with the character and weight of the paper stock and the sizes of the sheets currently operated upon.

When the topmost sheet has been entered between the rolls f, f', it will receive an initial impulse or twitch toward the right, which will serve to loosen or separate it from the remaining sheet across the area of the V-shaped supporting sections intermediately of the table. Accordingly, the sheet in question is free to pass between the rolls, while the remaining sheets are not affected by its movement. When said sheet has completely cleared the rolls, however, the one next beneath it will become engaged with the soft adhesive surface of the roll f, and it, together with the remaining sheets in turn, will be fed singly between these rolls; the fanned out forward edges of said sheets slipping readily along the inclined plate e into position, to be operated upon one at a time.

It is very important in a mechanism of this character that ample adjustment shall be afforded for the members of the supporting table with respect to the forwardly positioned plate e, with respect to the feeding rolls and with each other, inasmuch as different classes of paper stock and different sizes of sheets require a nicety of handling and of presentation to the rolls, in order to insure individual feeding.

My improved sheet-feeding machine affords every necessary and desirable adjustment, whereby very rapid and accurate feeding of all classes of paper stock and all sizes of sheets, within the range of the machine, may be maintained under average commercial conditions.

Having now described the preferred embodiment of my invention, I claim as new and desire to secure by Letters Patent, together with such modifications as may be made by one ordinarily skilled in the art, the following:

1. In a sheet-feeding mechanism, the combination with feeding rolls, of a sheet-supporting table positioned above said rolls; the same comprising independently adjustable sections exclusive of any separator member, and means for supporting said sections in various angular relations with respect to each other and to the rolls, substantially as set forth.

2. In a sheet-feeding mechanism, the combination with feeding rolls, of a sheet-supporting table coacting with, and positioned generally in a plane above and to the rear

of said rolls; the same comprising a plurality of independently adjustable sections pivotally related, a separator member, and means for supporting said sections in various angular relations with respect to each other, substantially as set forth.

3. In a sheet-feeding mechanism, the combination with a supporting frame, of a sheet-supporting table comprising a plurality of sections independently carried by said frame, adjusting means associated each to each with said sections, adapted to vary their angular relation, coacting feeding rolls and an abutment for the edges of the sheets positioned adjacent to said rolls forwardly of the supporting table and below the same, substantially as set forth.

4. In a sheet-feeding mechanism, the combination with reversely actuated paired feeding rolls, of a sheet-supporting table positioned rearwardly and above said rolls, means for adjusting the angular position of the table, and an abutment for the forward edges of the sheets positioned adjacent to the plane of contact of the feeding rolls, substantially as set forth.

5. In a sheet-feeding mechanism, the combination with reversely actuated paired feeding rolls, of a sheet-supporting table positioned rearwardly and above said rolls, comprising independently adjustable sections, means for supporting said sections in varying angular relation with respect to each other and to the rolls, and an abutment for the forward edges of the sheets positioned adjacent to the plane of their contact with the feeding rolls, substantially as set forth.

6. In a sheet-feeding mechanism, the combination with paired feeding rolls, of a sheet-supporting table positioned rearwardly and above said rolls; the same comprising a plurality of independently adjustable sections, adjusting means associated each to each with said sections whereby their angular position may be varied, and an abutment for the edges of the sheets disposed adjacent to the feeding rolls, substantially as set forth.

7. In a sheet-feeding mechanism, the combination with paired feeding parts, of an associated separator member, a sheet-supporting table associated with said parts; the same comprising a plurality of independently adjustable sections positioned to afford interrupted support for the sheets, and means for independently adjusting said sections, substantially as set forth.

8. In a sheet-feeding mechanism, the combination with paired feeding rolls, of a sheet-supporting table positioned rearwardly of said rolls; the same comprising a plurality of adjustable sections disposed to afford interrupted support for the sheets, adjusting means associated with said sections, and an abutment for the edges of the sheets positioned intermediately of the supporting table and feeding rolls, substantially as set forth.

9. In a sheet-feeding mechanism, the combination with co-acting feeding members, of a sheet-supporting table positioned rearwardly thereof, means for adjustably inclining said table towards the feeding members, and an intermediate abutment positioned at a distance below said sheet-supporting table adapted to support the forward edges of the sheets in proximity to said members, substantially as set forth.

10. In a sheet-feeding mechanism, the combination with a feeding roll, of an inclined sheet-supporting table positioned above and to the rear thereof, and an inclined edge-supporting plate associated with the roll approximately in its feeding plane and spaced below the forward edge of the supportable table, substantially as set forth.

11. In a sheet-feeding mechanism, the combination with feeding means, of a sheet-supporting table positioned above and rearwardly thereof, means for adjustably inclining said table toward the feeding means, and an edge-supporting member for the sheets positioned approximately in the operative plane of the feeding means, substantially as set forth.

12. In a sheet-feeding mechanism, the combination with paired feeding rolls having opposing resilient faces, of a detent adapted to prevent the rotation of one of said rolls in a plurality of stationary operative positions, and means for rotating the opposing roll adjacent thereto, substantially as set forth.

13. In a sheet-feeding mechanism, the combination with paired feeding rolls, of means for detaining one of said rolls, and alternative means for driving it in cooperation with the opposing roll, substantially as set forth.

14. In a sheet-feeding mechanism, the combination with paired feeding rolls having resilient operative faces, means for rotating said rolls in cooperative relation, and alternative means for withholding one of said rolls against rotation, substantially as set forth.

15. In a sheet-feeding mechanism, the combination with feeding means, of a separator member, an associated sheet-supporting table comprising a plurality of adjustable sections, and means for adjustably supporting said sections in variable operative positions with respect to each other and to said means, substantially as set forth.

16. In a sheet-feeding mechanism, the combination with opposing paired feeding rolls, of means for checking the rotation of one of said rolls to maintain it stationary in a plurality of positions, and further

means for rotating the other roll adjacent thereto for effecting the feed of successive sheets, substantially as set forth.

17. In a sheet-feeding mechanism, the combination with opposing paired feeding rolls, of a notched wheel upon one of said rolls, a spring-actuated detent adapted to engage said notched wheel and check the rotation of said roll in a plurality of positions, and means for rotating the opposing roll adjacent to the detained roll for effecting the feed of successive sheets, substantially as set forth.

18. In a sheet-feeding mechanism, the combination with the feeding members, of means for effecting their operation upon successive sheets, an edge-supporting part directly associated with said members adapted to serve as a separator, and an adjustable sheet-supporting table comprising a plurality of independently adjustable sections positioned to afford an uneven or linearly broken support for the sheets, substantially as set forth.

In testimony whereof I do now affix my signature.

REUBEN HITCHCOCK.