

R. HITCHCOCK.
PAPER FOLDING MACHINE.
APPLICATION FILED AUG. 5, 1915.

1,285,705.

Patented Nov. 26, 1918.

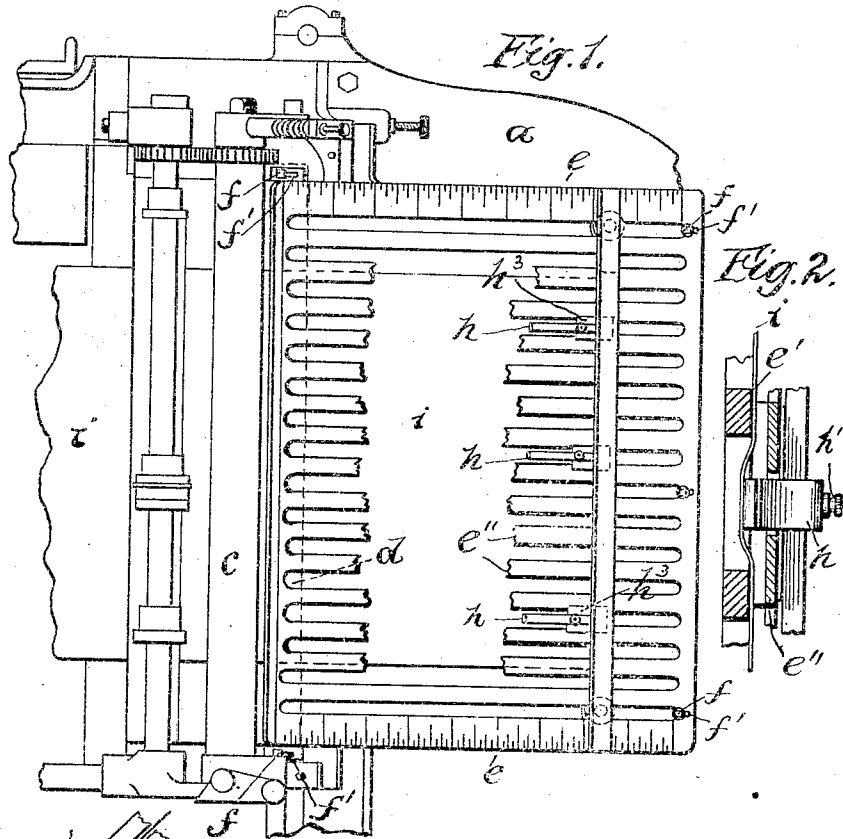


Fig. 2.

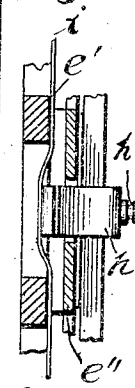


Fig. 3.

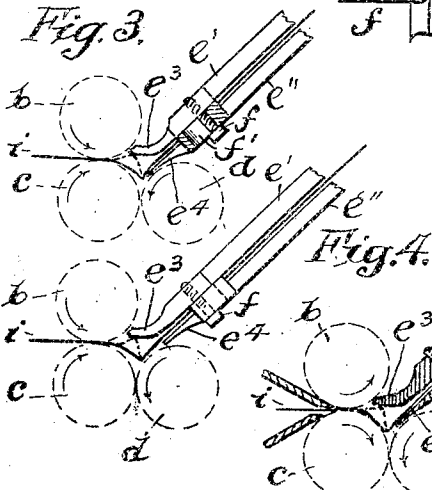


Fig. 5.

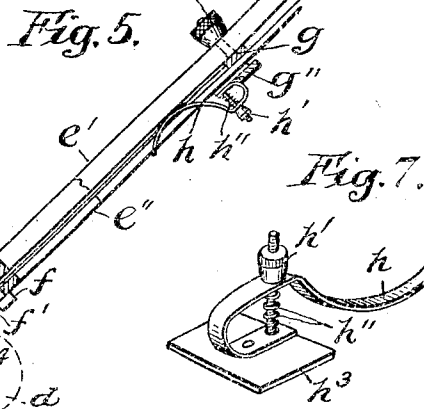


Fig. 7.

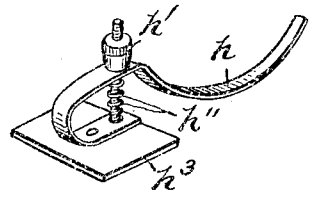


Fig. 4.

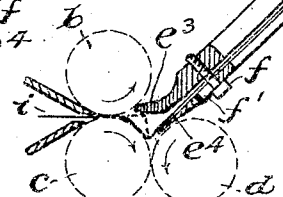
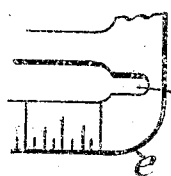


Fig. 6.



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Witnesses

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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.

PAPER-FOLDING MACHINE

1,285,705.

Specification of Letters Patent.

Patented Nov. 26, 1918.

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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 Paper-Folding Machines, of which the following is a specification.

My invention relates to improvements in paper folding machines, and more particularly to certain features pertaining to the buckling or side plates of said folding machines, whereby accuracy in forming the folds is insured.

As will be recognized, folding machines must operate successfully with widely different classes of paper stock, upon folds of various classes and descriptions, and such folds as are to be made along predetermined scored or slit signatures. It is with the latter class of folds that the most difficulty is encountered in practice, for the reason that the folds must be formed with absolute accuracy, while the slit, or scored paper presents difficulties in folding, unless the folding machine operates with the greatest possible accuracy, and at the lines of scoring.

The present improvements were devised, in order to overcome the difficulties above referred to, and are embodied in a buckling or side plate of the folding machine associated with buckling and creasing rolls, wherein one member of said side plate is made adjustable with respect to said rolls, and is provided with laterally acting supporting springs which are adjustable, both with respect to their position and tension exerted upon the signature within the side plate. My improvements may be more readily explained in connection with the accompanying drawings, wherein,

Figure 1 is a fragmentary view partly in side elevation, of a folding machine, showing the buckling plate centrally broken away, together with the co-acting rolls, equipped with my improvements.

Fig. 2 is an enlarged fragment in transverse section, illustrating the adjustable spring within the buckling plate.

Fig. 3 is a fragmentary view partially in diagram and cross-section, illustrating the folding operation with the outer grid of the side plate in its forwardly adjusted position.

Fig. 4 is another fragmentary and partially diagrammatic view illustrating the folding operations with the outer grid of the side plate in its rearwardly adjusted position.

Fig. 5 is a similar view partially in section, illustrating the relation of the several co-acting members and spring with respect to the side plate. Further details thereof are shown in application Ser. No. 846,465.

Fig. 6 is a fragment of the outer grid with its slot for affording longitudinal adjustment thereof, and Fig. 7 is an enlarged view of the screw-adjusted spring.

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

In said drawings, the folding machine is merely suggested in the principal view, for illustrating the relation of the side buckling plate, set at an angle with said folding machine, wherein the buckling rolls direct each signature in turn, for the purpose of forming a right-angle fold. Further illustration and explanation of the features of such folding machine are unnecessary for an understanding of my present invention. Moreover, roll *d*, Fig. 1, is omitted for clearness.

In Fig. 1, the frame *a* of the folding machine is provided with three vertically positioned buckling and creasing rolls *b*, *c*, *d*, which are designed to pass each signature into the side buckling plate *e*, set at an angle of 45° with the side frames of the folding machine, and thereafter form a transverse or right-angle fold in the signature. The side plate *e* comprises a stationary grid *e'* and the adjustable spaced grid *e''*;—the latter being made adjustable with respect to the rolls and grid *e'* by means of slots *f'*, which accommodate the adjusting bolts *f*, positioned adjacent to the corners or edges of said grid.

The top and bottom edges of the side plate are marked with corresponding scales, by which to engage the position of the adjustable stop *g*, which is secured by thumb nuts *g'* and an outer strip *g''*, adapted to be clamped in place by said thumb nuts.

Beneath this strip *g''* I preferably insert one or more laterally acting spring members *h*, of the type best shown in Figs. 2 and 7; these bowed springs being adapted to extend

between the bars of the grids, in position to bear laterally against, and support the signature while it is in extended position within the side plate. Each spring is provided with a thumb nut h' acting against a coiled spring h'' , and all of the parts are secured upon the flat base portion h^3 , adapted to be gripped by the strip g'' , as best shown in Fig. 5.

These springs h are provided for preventing the sagging of the sheet or signature within the side plate, so that its extended portion will be retained with its edges in alinement with the remainder of the folded sheet as it comes from between the rolls. In consequence, the fold effected between the rolls c, d , invariably will be formed at right angles with the edges of the paper, and this simple device permits the very rapid operation of the machine.

In practice, it is found that the weight of the paper and the thickness of the signature will vary materially with different classes of work required of the folding machine, and in consequence, it is very desirable accurately to adjust the effective tension of the springs h , so that they will be adapted to support any given signature within the side plate, without in the least impeding its movement therein. Accordingly, I have provided each spring with means for accurately adjusting or setting its tension to correspond with the particular work in hand, which comprises the thumb nut acting against the tension, both of the bowed spring and the coil spring above described.

The action of the buckling and creasing rolls and the associated side or buckling plate, is found to vary with different classes of work, and as extreme examples thereof, I may cite the formation of two folds at right angles, made in a signature of relatively light paper stock, and the formation of a right angle fold in a signature of resilient paper stock having parallel accordion folds; these signatures being assumed to have been slit or scored for the right angle fold. Under all circumstances, it is obvious that the fold must be formed exactly at the scored line or slit, in order to secure perfectly folded signatures.

However, the action of the creasing rolls is found to vary widely with different classes of paper stock, and such action, I have discovered, may be facilitated and improved by covering or uncovering more or less of the periphery of one of said rolls. This may be accomplished by an adjustment of the buckling plate with respect to the rolls.

After much experiment, I have found that generally speaking, the outer grid of the side plate should be adjusted so that it will expose a large area of the creasing roll d , as shown in Fig. 4, in order to avail of the tractive effect of said roll in advancing the signature between the rolls c, d . With a limited

exposure of the roll d , it is found on the other hand, that not infrequently the buckle of the paper, which is indicated by the dotted line, will become so pronounced as to form a double fold in the entering portion of the signature, and thereby spoil it and prevent its use.

With the grid properly adjusted to expose roll d , the slit portions of the sheet of paper i will be advanced accurately between the creasing rolls c, d , and the fold will be formed at right angles with any initial fold or folds and in the required position. Under these conditions the extension e^3 of the grid e' forms an abutment, against which the paper re-acts or springs, as it passes between the buckling rolls b, c , after its forward edge has engaged the stop, while the retracted extension e^4 of the grid e'' permits the advance of the signature between the creasing rolls, by the tractive effect of roll d , and the formation of a double fold, is thereby avoided.

This results from the spring of the signature, as its end strikes the stop, so that a bend or loop of the paper instantly formed, is thrown against the rotating surface of roll d , which initiates the withdrawal of the signature from the buckling plate, and enters its scored line between rolls c, d .

With various classes of paper stock and particularly that affording some considerable resiliency, the opposite adjustment of the grid is required. Thus it is found that often the pressure of the buckling rolls b, c , will cause the paper to spring open slightly, particularly at the corners and the resulting fold not infrequently, will exhibit a backwardly turned corner or corners in the signature. To guard against this the grid e'' is so adjusted as partially to cover roll d , or positioned so that the extension e^4 will engage the out-turned edge or corner of the signature as it comes from the rolls b, c , and direct it into the buckling plate, in order that it may not be deflected or folded backward. This adjustment is shown in Fig. 2 of the drawings, and should be carefully made so that as much of the above described tractive effect of the roll d may be availed of, as conditions will permit.

In the machine herewith illustrated, I have adopted the simple expedient of adjusting one of the grids of the buckling plate for obtaining the desired cooperation with the buckling and creasing rolls; nevertheless my invention is not necessarily limited to this particular construction. Other adjusting means obviously might be substituted for covering and exposing the initial tractive roll for effecting the fold and for regulating the respective positions or relation of the grid-members, which my said invention also contemplates.

Having therefore described the preferred

embodiment of my invention, I claim as new and desire to secure by Letters Patent, the following:—

1. In a folding machine, the combination with a buckling plate comprising spaced grids and its co-acting folding and buckling rolls, of a paper stop within said buckling plate, a bowed spring positioned between two opposing grid-openings to bear against the folded sheet while traveling in said buckling plate, and screw-acting means for adjusting the pressure of said spring upon the folded sheet, substantially as set forth.

2. In a folding machine, the combination with its right angle folding mechanism comprising folding and buckling rolls, a buckling plate comprising spaced grids vertically positioned adjacent thereto, a paper stop therein, an adjustable spring extending within said buckling plate between two opposing grid-openings in the path of the paper, and screw-acting means for adjusting the pressure to be exerted by said spring, substantially as set forth.

3. In a folding machine, the combination with co-acting buckling and folding rolls, of a vertically positioned buckling plate associated therewith, comprising opposing grids spaced apart to permit the passage of the paper, an adjustable paper stop, a bowed spring extending through registering openings in both grids, adapted to engage and deflect the sheets when traveling between said grids, and screw-acting means for adjusting the pressure to be exerted by said spring, substantially as set forth.

4. In a folding machine, the combination with co-acting buckling and creasing rolls, of a buckling plate associated with said rolls, and adjustable means for shielding portions of a creasing roll to vary its initial tractive effect upon the signature within the buckling plate, substantially as set forth.

5. In a folding machine, the combination with co-acting folding and buckling rolls, of a buckling plate associated therewith, comprising spaced members and means for adjusting one of said members with respect

to the rolls for shielding variable portions of the periphery of a roll, substantially as set forth.

6. In a folding machine, the combination with co-acting folding and buckling rolls, of a buckling plate associated therewith, comprising two members spaced apart to permit the passage of the folded sheet, a paper stop therein, and means for effecting the adjustment of one of said members with respect to the rolls for shielding variable portions of the periphery of a roll, substantially as set forth.

7. In a folding machine, the combination with a set of folding and buckling rolls, of a buckling plate associated therewith, comprising two relatively adjustable spaced grids, and means for adjusting one of said grids to cover more or less of the periphery of one of the folding rolls, substantially as set forth.

8. In a folding machine, the combination with a set of folding and buckling rolls, of a buckling plate associated therewith, comprising two spaced grids, one of which is stationary and the other adjustable with respect to said rolls; the stationary grid being provided with an abutment adapted to be engaged by the folded sheet, and means for adjusting the adjustable grid to expose more or less of the periphery of one of said folding rolls, substantially as set forth.

9. In paper-folding mechanism, the combination with coacting folding and buckling rolls, of an associated buckling plate, comprising two spaced members between which the buckling is initiated, and means for effecting the adjustment of one of said members with respect to a roll whereby alternately to shield or expose variable portions thereof, substantially as set forth.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

REUBEN HITCHCOCK.

Witnesses:

WM. B. WOOD.

ALBERT LYNN LAWRENCE.