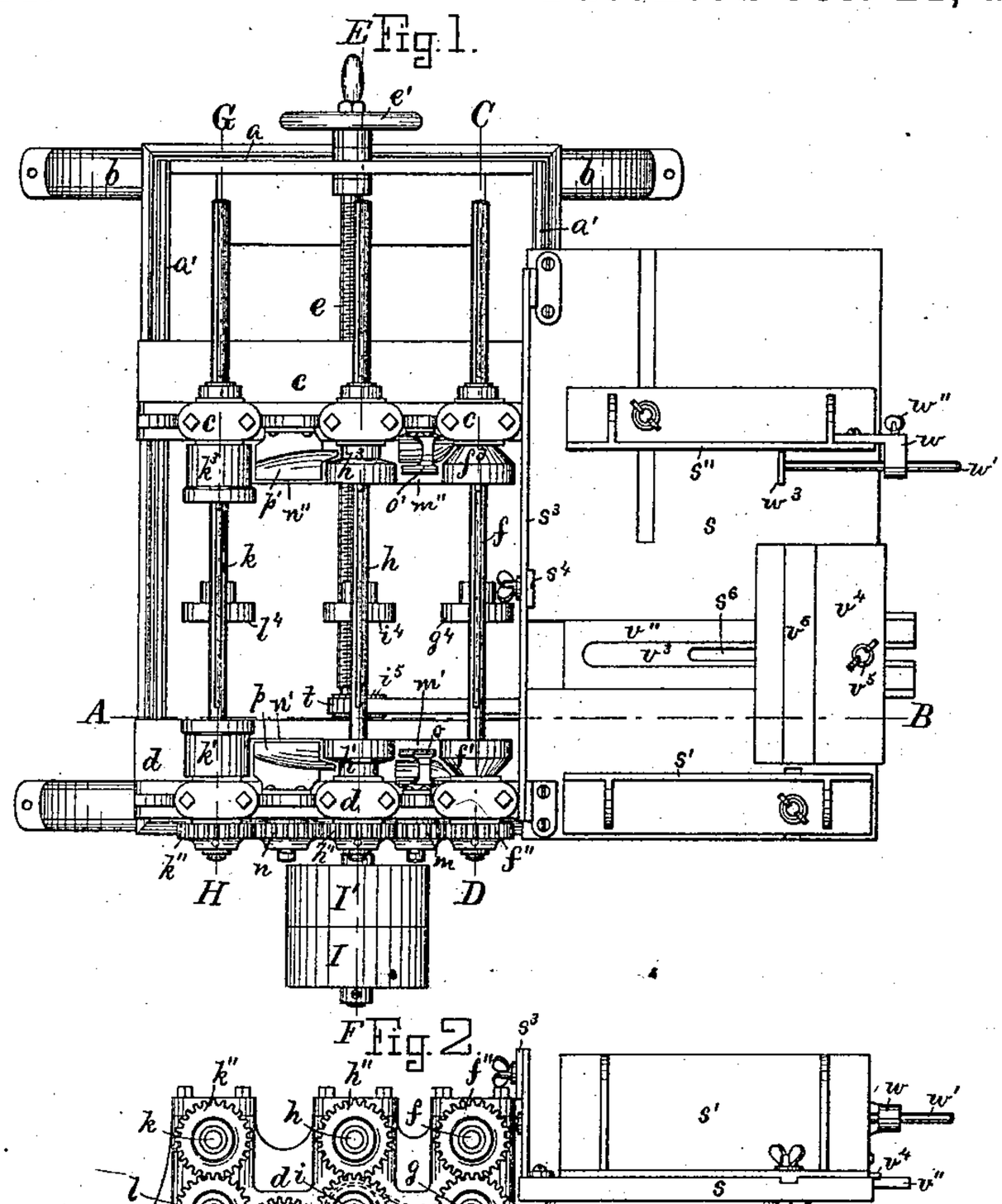
(No Model.) 3 Sheets—Sheet 1.

G. W. GLAZIER & J. B. ROLLINS.

PAPER BOX SCORING AND FOLDING MACHINE.

No. 306,824. Patented Oct. 21, 1884.

Fig. 1.



Witnesses

Henry Shadbourn.

H. C. Holt

Inventors

George W. Glazier

and John B. Rollins

by Alban Andrén. atty.

(No Model.) 3 Sheets—Sheet 2.

G. W. GLAZIER & J. B. ROLLINS.

PAPER BOX SCORING AND FOLDING MACHINE.

No. 306,824. Patented Oct. 21, 1884.

Fig. 3.

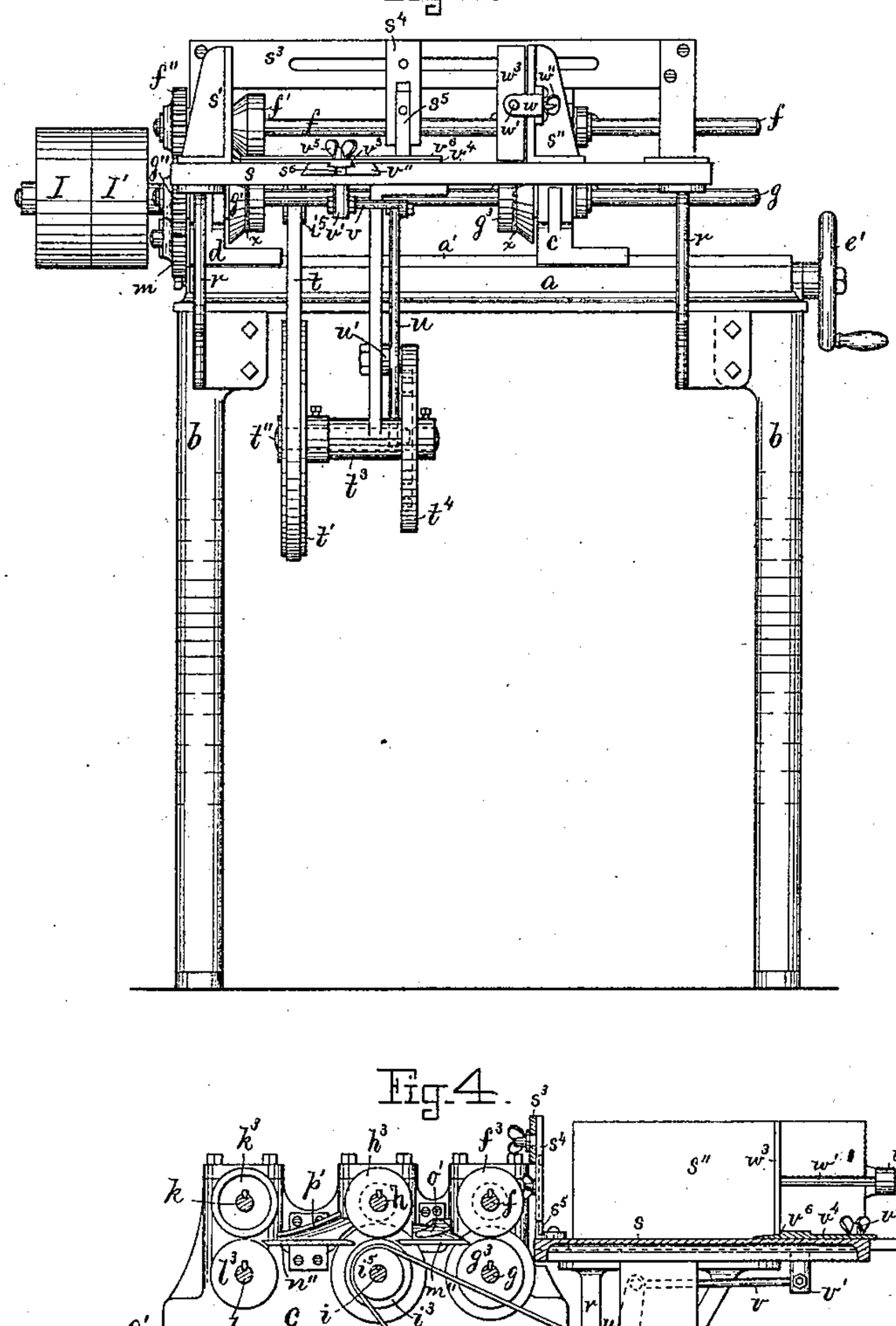
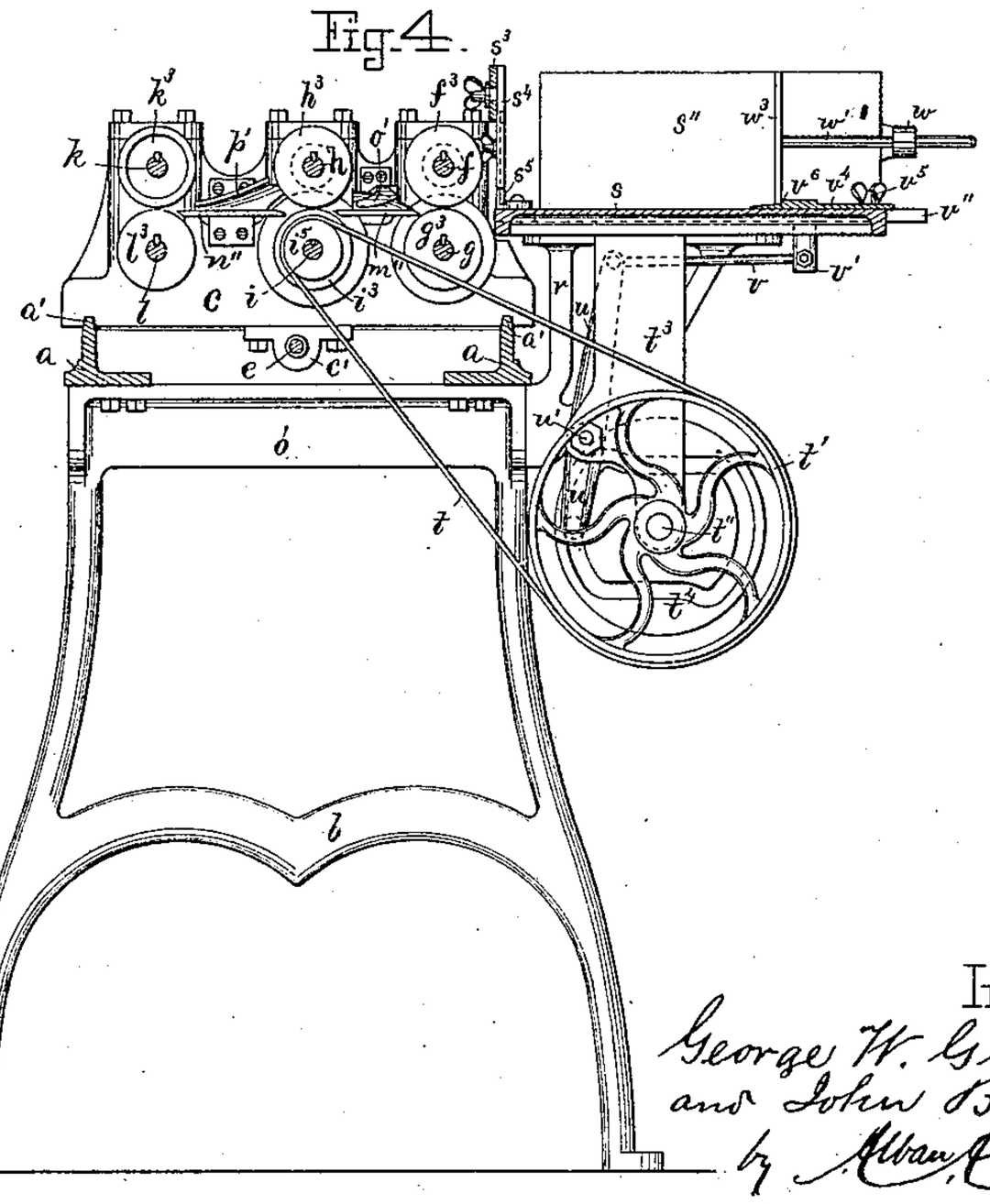


Fig. 4.



Witnesses
Henry Chadbourn
H. C. Holt

Inventors
George W. Glazier
and John B. Rollins
by Albert Andrews atty

(No Model.) 3 Sheets—Sheet 3.

G. W. GLAZIER & J. B. ROLLINS.

PAPER BOX SCORING AND FOLDING MACHINE.

No. 306,824. Patented Oct. 21, 1884.

Fig. 5.

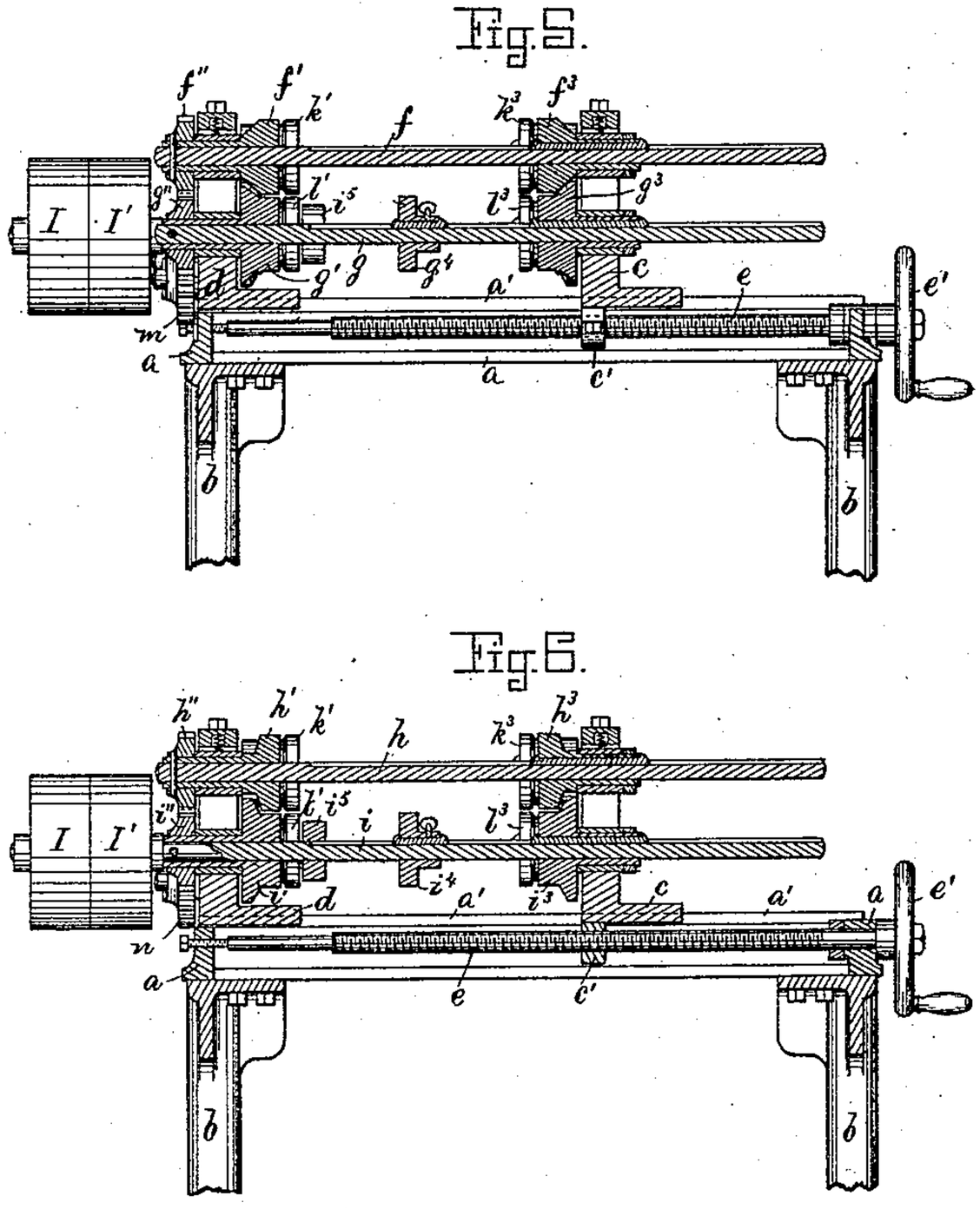


Fig. 6.

Fig. 7.

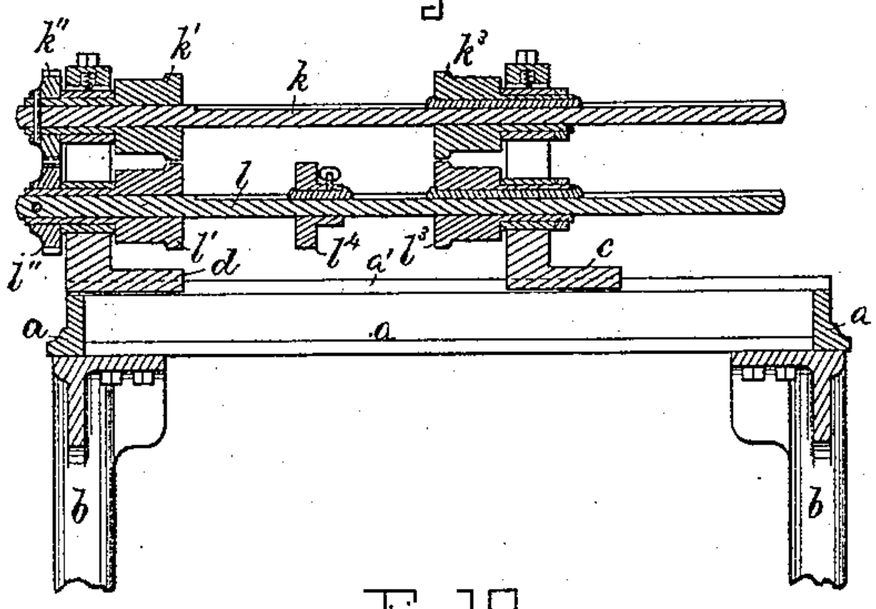


Fig. 8.

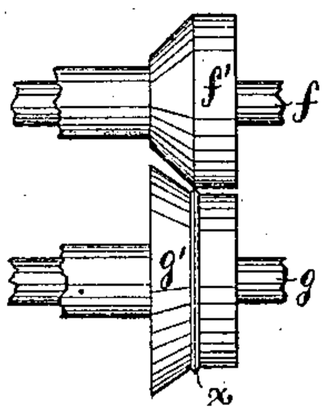


Fig. 9.

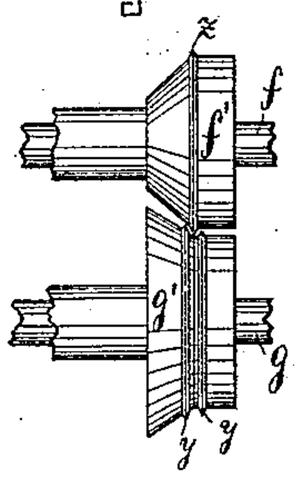
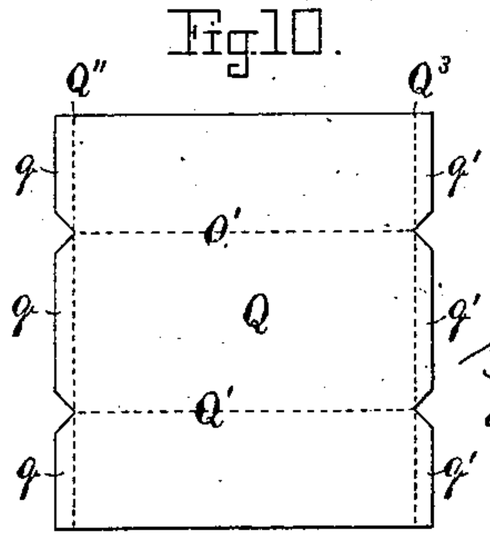


Fig. 10.



Witnesses
Henry Chadbourn.
H. C. Holt

Inventors
George W. Glazier
and John B. Rollins
by Alban Andrén atty

UNITED STATES PATENT OFFICE.

GEORGE W. GLAZIER, OF SALEM, AND JOHN B. ROLLINS, OF LYNN, MASS.

PAPER-BOX SCORING AND FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 306,824, dated October 21, 1884.

Application filed December 3, 1883. (No model.)

To all whom it may concern:

Be it known that we, GEORGE W. GLAZIER, a citizen of the United States, residing at Salem, in the county of Essex and State of Massachusetts, and JOHN B. ROLLINS, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have jointly invented certain new and useful Improvements in Paper Box Scoring and Folding Machines; and we do hereby declare that the same are fully described in the following specification and illustrated in the accompanying drawings.

This invention relates to improvements in paper-box folding and scoring machines; and it has for its object to automatically feed the box blanks or stock, one or more pieces at a time, to improved mechanism for folding the two opposite sides or flaps of the blank, by which such side edges are automatically turned or folded, to enable the box-blank to be afterward set up and united to the usual end pieces. Said box-blanks may be scored in whole or part previous to being fed to the improved folding mechanism. For instance, the blanks may be first scored in an ordinary scoring-machine, both laterally and longitudinally, and then passed through our improved folding mechanism for turning over the side flaps or edges; or the blank may be scored only laterally in a suitable scoring-machine, and then scored longitudinally while being passed through our improved folding-machine. The folding-rollers are adjustable to and from each other in a horizontal direction, according to the width of the pasteboard blank that is to be scored or folded, as will hereinafter be more fully shown and described, reference being had to the accompanying drawings, where—

Figure 1 represents a plan view, and Fig. 2 represents a side elevation of the improved machine. Fig. 3 represents a front elevation of the same. Fig. 4 represents a cross-section on the line A B shown in Fig. 1. Fig. 5 represents a longitudinal section on the line C D shown in Fig. 1. Fig. 6 represents a longitudinal section on the line E F shown in Fig. 1; and Fig. 7 represents a longitudinal section on the line G H, also shown in Fig. 1. Fig. 8 represents a detail view of the first pair of folding-rollers, and Fig. 9 represents a modification thereof for folding with rounded corners. Fig. 10 represents a plan view of a box-blank that is to be folded.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

a represents the frame of the machine, mounted upon and secured firmly to suitable legs or standards, *b b*, as shown. The frame *a* has on its upper side a pair of longitudinal and parallel guideways, *a' a'*, upon which the movable head-stock *c* is adjusted to and from the stationary head-stock *d*, according to the width of the pasteboard blank the flaps of which are to be folded. The head-stock *d* is firmly secured to the frame *a* by means of suitable bolts or similar means.

e is a screw-shaft located in bearings in the frame *a*, and provided in its outer end with a crank-wheel, *e'*, by which it can be turned around its axis for the purpose of adjusting the position of the movable head-stock *c* in relation to the stationary head-stock *d*, for which purpose said screw-shaft *e* is made to pass through a screw-threaded projection *c'*, on the under side of the head-stock *c*, as shown in Figs. 5 and 6.

In suitable bushings in a slot in the stationary head-stock *d* are located the first pair of roller-shafts, *f* and *g*. On the inside of the head-stock *d* are secured to the respective shafts, *f* and *g* the rollers *f'* and *g'*, as shown in Figs. 5 and 1, and to the outer ends of said shafts *f g* are secured, respectively, the pinions *f''* *g''*, the teeth of which gear into each other. Similar rollers, f^3 g^3, are splined to the respective shafts *f g*, and so journaled in bushings located in a slot in the movable head-stock *c* as to rotate with the shafts *f g*, and also to follow the longitudinal adjustment of the head-stock *c* as the latter is moved to and from the head-stock *d;* and we wish to state that we do not confine ourselves to any particular manner of so journaling the said rollers f^3 g^3 to the head-stock *d*, as this may be done in any of the well-known methods used in feeding devices for drilling or boring machines, it being only essential that the rollers f^3 g^3 shall rotate with the respective shafts *f* and *g*, and to follow with the head-stock *c* as the latter is adjusted.

h and *i* represent the second pair of shafts, located in bushings in the head-stock *d*, as

above described, and having attached to them on the inside of the head-stock *d* the respective folding-rollers *h* and *i*, as shown in Fig. 6. To the outer ends of said shafts *h* and *i* are attached, respectively, the pinions *h''* *i''*, meshing into each other, as shown in Figs. 2 and 6. Rollers h^3 i^3 are splined to the respective shafts *h* *i*, and connected to the movable head-stock *c* in the same manner as hereinabove described, so that said rollers h^3 i^3 shall follow the longitudinal adjustment of the head-stock *c*, and also so as to rotate with the shafts *h* and *i*.

k and *l* represent the third pair of shafts, located in suitable bearings in the stationary head-stock *d*, and provided on the inside of the latter with the respective folding-rollers *k'* *l'*, and on the outside of said head-stock with the respective pinions *k''* *l''*, gearing into each other, as shown in Figs. 2 and 7. Rollers k^3 l^3 are splined to the respective shafts *k* *l* and connected to the movable head-stock *c* in the same manner as hereinabove described, so that said rollers k^3 l^3 shall follow the longitudinal adjustment of the head-stock *c*, and also to rotate with said shafts *k* and *l*, respectively.

m represents an intermediate loose gear meshing into the respective pinions *g''* *i''*, and *n* represents another intermediate gear meshing into the respective pinions *i''* *l''*, as shown in Fig. 2, by which arrangement all the shafts *f*, *g*, *h*, *i*, *k*, and *l* are positively geared together. The shaft *i* is the driving-shaft, and is for this purpose provided with fast and loose pulleys I I', to which a rotary motion is imparted by means of a suitable belt or cord, or similar means.

On each of the shafts *g*, *i*, and *l* is located, about midway between their folding-rollers, respectively, the longitudinally-adjustable circular disks g^4, i^4, and l^4, which serve as central rests or supports for the pasteboard blank as it is fed forward between the folding-rollers of the machine.

To the inside of the stationary head-stock *d* is secured a plate or rest, *m'*, between the lower rollers, *g'* *i'*, as shown in Fig. 1. A similar plate or rest, *n'*, is secured to the inside of stationary head-stock *d*, between the lower rollers, *i'* *l'*. Similar rests, *m''* *n''*, are secured to the inside of movable head-stock *c*, between the respective rollers g^3 i^3 and i^3 l^3, which plates serve as supports for the pasteboard blank while being fed forward between the rollers.

Above each of the rests *m'* *m''* is located the respective projections or presser-feet *o* *o'*, which serve the purpose of retaining the pasteboard blank against the rests *m'* *m''* and to guide it properly between the second sets of rollers, *h'* *i'* and h^3 i^3.

Above the rests *n'* *n''* are located the curved folders *p* *p'*, which serve the purpose of doubling over the projecting ends or flaps of the pasteboard blank and to guide it properly between the third sets of roliers, *k'* *l'* k^3 l^3.

In Fig. 10, Q represents the pasteboard blank that is to be folded, and *q* *q'* represents the end flaps or projections that are to be folded over by our automatic machine.

Q' Q' are the lateral scoring-lines, and Q'' Q^3 are the longitudinal scoring-lines, on the under side of said blank, as usual.

If it is desired to make the scoring-lines Q'' Q^3 on the under side of the pasteboard blank while it is being fed through our folding mechanism, we provide the lower rollers, *g'* g^3, each with an annular scoring projection, X, as shown in Fig. 8. If it is desired to bend the flaps *q* *q'* with rounded edges at their junction with the main part Q, we make the lower rollers, *g'* g^3, with a pair of parallel annular scoring projections, *y* *y*, as shown in Fig. 9, and provide the upper rollers, *f''* f^3, each with an annular scoring projection, Z, as shown in said Fig. 9, the latter being so located as to enter between the projections *y* *y* on the lower rollers.

To the front of the machine is secured a pair of brackets, *r* *r*, having attached to their upper ends the table or plate S, serving as a support for the pile of pasteboard blanks that are to be folded.

s' *s''* are side guides for the pasteboard blanks, which guides are made adjustable in a lateral direction to and from each other, and after being so adjusted they are secured by means of screws or equivalent means to the table *s*.

In front of the first set of rollers, *f'* *g'* f^3 g^3, is secured to the table or plate *s* the horizontal beam s^3, on which the stop projection s^4 is made adjustable in a horizontal direction.

On the stop s^4 is the foot-piece s^5, made vertically adjustable by means of a suitable set-screw or equivalent device, so that its lower end may be set just so far above the plate *s* as to permit only one or two pasteboard blanks to be pushed forward under the foot s^5 toward and between the first rollers in the machine.

For the purpose of automatically feeding one or two sheets at a time toward the rollers, we employ the following automatic feeding mechanism, viz: To the shaft *i* is secured a small pulley, i^5, from which a rotary power is conveyed by means of a belt or cord, *t*, to the pulley *t'*. secured to a shaft, *t''*, that is located in a bearing-piece. t^3, depending from and secured to the under side of the table or plate *s*. To the shaft *t''* is secured the grooved cam-disk t^4, which actuates the lower end of the rock-lever *u*, that is hung at *u'* to the bearing-piece t^3, and is provided in its lower end with a pin and roll projecting into the groove on the side of cam t^4, as shown in Figs. 3 and 4. To the upper end of the lever *u* is hinged the connecting-rod *v*, that is jointed in its forward end to the stud *v'*, projecting up through a slotted opening, s^6, in the table *s*, and secured to the sliding reciprocating feed-plate *v''*, that is thus caused to move forward and back in suitable guides in table *s*, as shown in Figs. 1 and 3. The feed-plate *v''* has a slotted groove, v^3, in which the adjustable carrier-plate v^4 is ad-

justed to and from the first set of rollers, and secured in place on the feed-plate v'' by means of fastening-screws v^5, or equivalent device, to compensate for the variations in length of the card-board blanks that are to be fed to the folding mechanism. The carrier-plate v^4 has on its upper side a ledge or projection, v^6, of a thickness about equal to the thickness of the pasteboard blank, and it serves the purpose of automatically pushing forward the lowest sheet of pasteboards in the pile resting on the table s, and to feed it forward below the foot-piece s^5 far enough to permit the set of rollers f' g' f^3 g^3 to act upon said sheet, and to feed it along between the successive sets of rollers for folding the blank as described. To the side guide, s'', is secured a small bracket, w. in which the rod w' is adjustable to and from the first set of rollers, and is secured in place after being adjusted by means of a set-screw, w'', or equivalent device, as shown in Figs. 1 and 3. To the forward end of rod w' is secured the bar or plate w^3, that serves as a back-rest for the pile of card-board sheets during the operation of the machine, and said plate serves to prevent the card-boards from being drawn backward by the return motion of the carrier-plate v^4 and its projection v^6.

The operation of this our improved folding-machine is as follows: The pasteboard blanks Q (shown in Fig. 10) are laid in a pile on the plate or table s, between the side guides, s' s'', and between the front and rear stops, s^4 and w^3. The machine is then set in operation, causing the lowest (or two lowest) sheet or blank in the pile to be automatically pushed forward between the first set of folding-rollers, f' g' f^3 g^3. Each of said rollers is made to lap by its corresponding roller, as shown in Fig. 5, by which the flaps q q' on the sides of the blank are bent partially upward, (and scored on the under side, if so desired,) according to the shape and bevel of such rollers. The blank continues to pass along its flaps q q', respectively passing between the rests m' m'' and presser-feet o o', to retain the acquired bend of said flaps and to guide it properly to and between the second set of rollers, h' i' h^3 i^3, where the flaps are still further bent upward by the increased inclines on said rollers, and after passing by the latter the blank, with its flaps, passes between the respective rests n' n'' and curved folders p p', causing the flaps q q' to be laid flat or nearly onto the main portion of the blank, after which it passes between the last rollers, k' l' k^3 l^3, for the purpose of compressing the flaps against the blank, and after the folded blank has passed by the said last set of rollers the elasticity of the material of which the blank is composed will cause the now liberated flaps to spring upward to nearly a right angle to the main portion of the blank, which is the proper position for securing the usual end pieces of the box to the now folded flaps.

The automatic-feeding mechanism above described is so timed in relation to the speed of the rollers that the blanks are automatically fed forward and carried between the folding-rollers in quick succession.

Having thus fully described the nature, construction, and operation of our invention, we wish to secure by Letters Patent and claim—

1. In a paper-box-folding machine, the stationary head-stock d, with its rotary shafts f g h i k l, and rollers f', g', h', i', k', and l', combined with the adjustable head-stock c, having journaled to it the rollers f^3, g^3, h^3, i^3, k^3, and l^3, substantially as described, so as to permit the latter rollers to follow with the adjustable head-stock c and to rotate with their respective shafts, as and for the purpose set forth.

2. In a paper-box-folding machine, the stationary head-stock d, with its rollers f' g' h' i' k' l' and intermediate presser-foot, o, rest m', curved folder p. and rest n', combined with the adjustable head-stock c, having journaled to it the rollers f^3 g^3 h^3 i^3 k^3 l^3, and secured to it the respective presser-foot and curved folder o' and p' and rests m'' n'', as set forth.

3. In a paper-box-folding machine, the stationary head-stock d, its shafts f g h i k l and rollers f' g' h' i' k' l', the adjustable head-stock c, with its rollers f^3 g^3 h^3 i^3 k^3 l^3, combined with the screw-shaft e, for adjusting the movable head-stock c in relation to the width of pasteboard blank, in a manner as set forth and described.

4. In a paper-box-folding machine, the stationary head-stock d, with its shafts and folding-rollers, as described, and the movable head-stock c, with its folding-rollers, as described, in combination with sliding feed-plate v'', having adjustable carrier-plate v^4 v^6 for the purpose of automatically feeding the pasteboard blanks to the action of the folding-rollers. in a manner as set forth.

5. In a paper-box-folding machine, the stationary and movable head-stocks and their respective folding-rollers, as described, combined with table s, horizontally-adjustable stop s^4, and vertically-adjustable foot-piece s^5, as set forth.

6. In a paper-box-folding machine, the stationary and movable head-stocks and their respective folding-rollers, as described. combined with table s and adjustable side guides, s' s'', as and for the purpose set forth.

7. In a paper-box-folding machine having head-stocks d and c, with their shafts and folding-rollers, as described, the table s, with its sliding feed-plate v'' and adjustable carrier-plate v^4 v^6, in combination with the longitudinally-adjustable rear stop, w^3, as and for the purpose set forth.

In testimony whereof we have affixéd our signatures in presence of two witnesses.

GEORGE W. GLAZIER.
JOHN B. ROLLINS.

Witnesses:
ALBAN ANDRÉN,
H. C. HOLT.