3 Sheets—Sheet 1.

W. R. COLE & N. EISENLORD.

Paper-Folding Machine.

No. 222,245. **Patented Dec. 2, 1879.**

Fig. 1

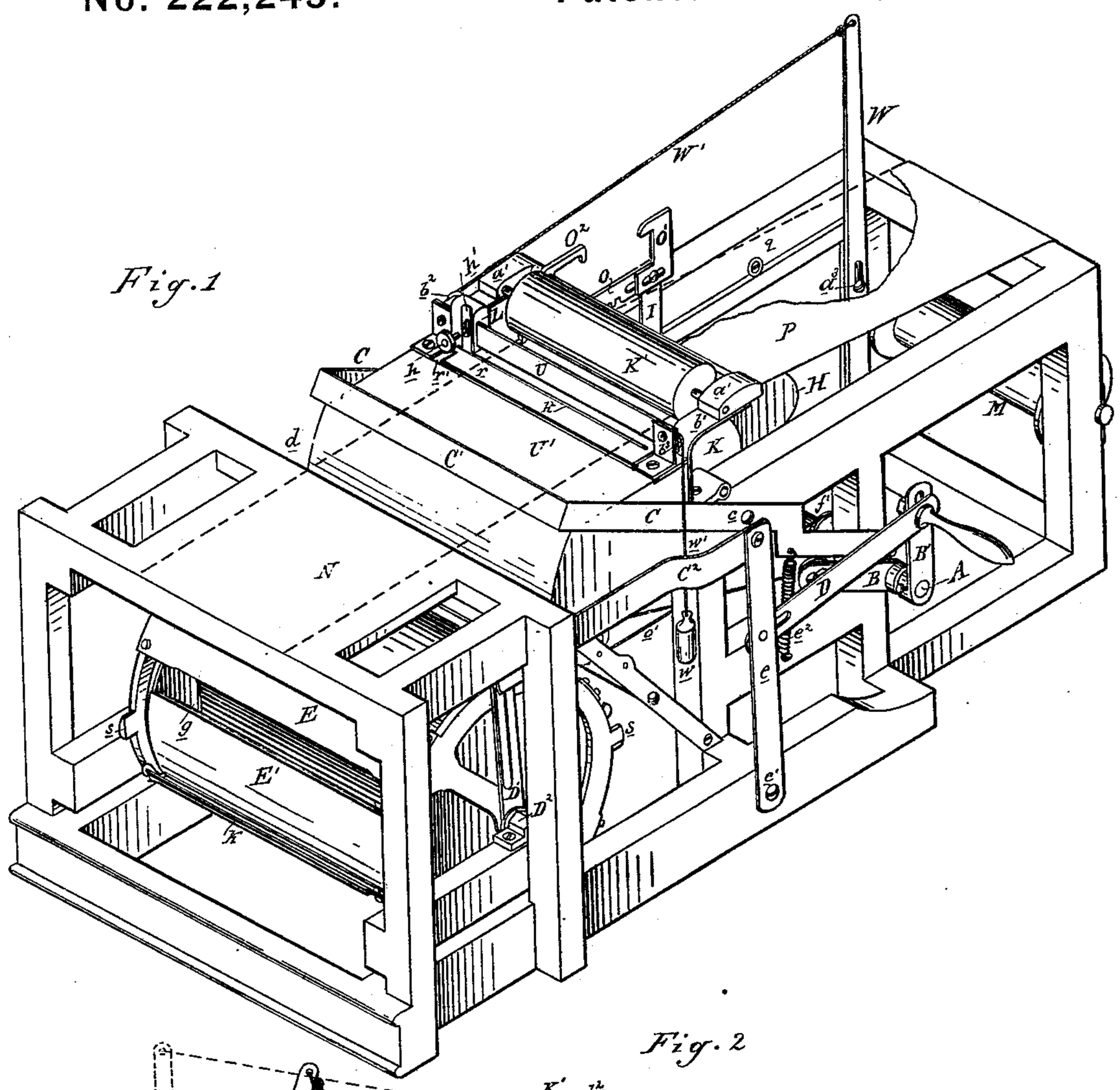
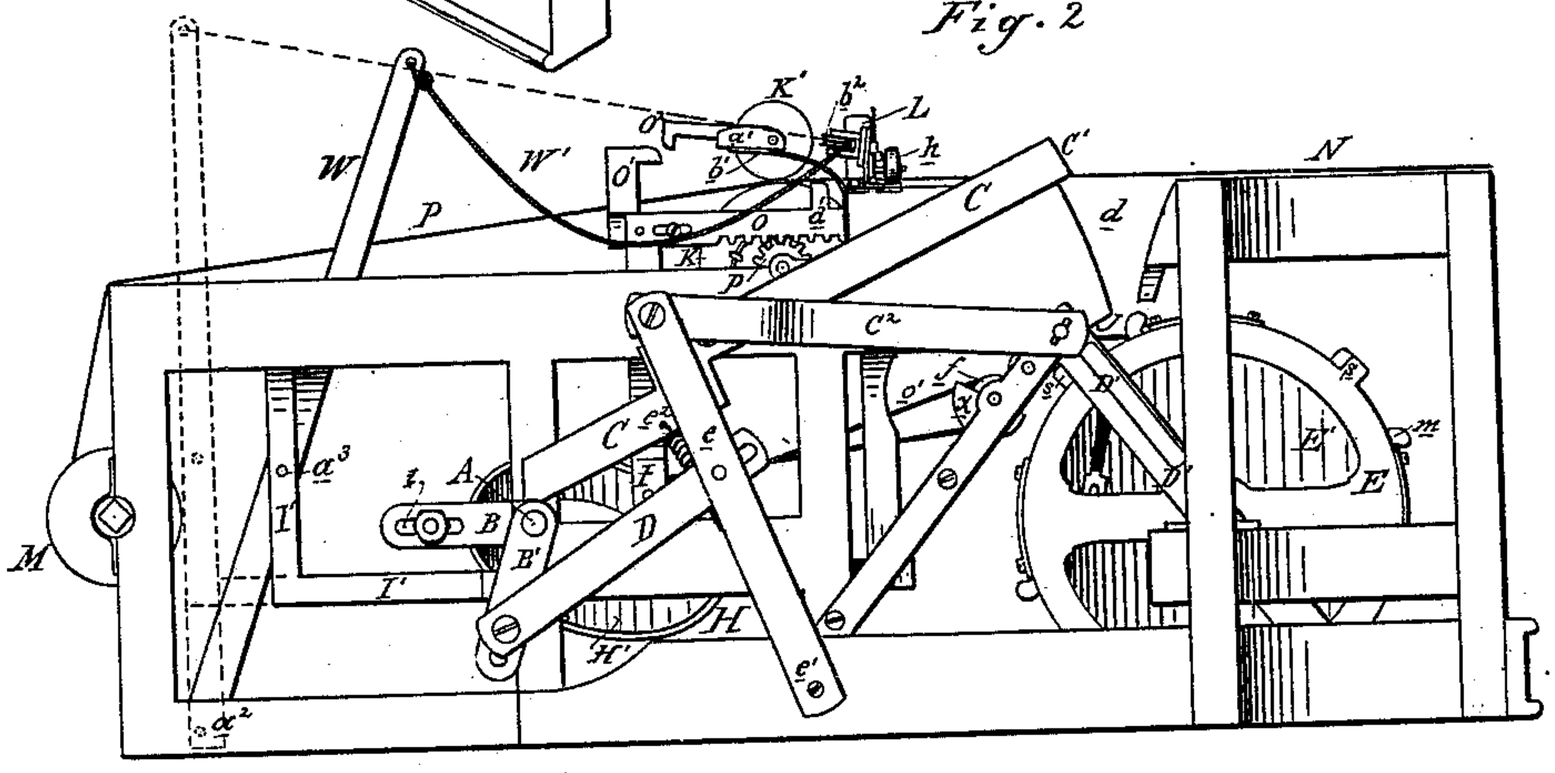


Fig. 2



Attest:
A. Barthel
A. S. Sprague

Inventor:
W. R. Cole
N. Eisenlord
By Atty
Thos. S. Sprague

3 Sheets—Sheet 2.

W. R. COLE & N. EISENLORD.

Paper-Folding Machine.

No. 222,245. Patented Dec. 2, 1879.

Fig. 3

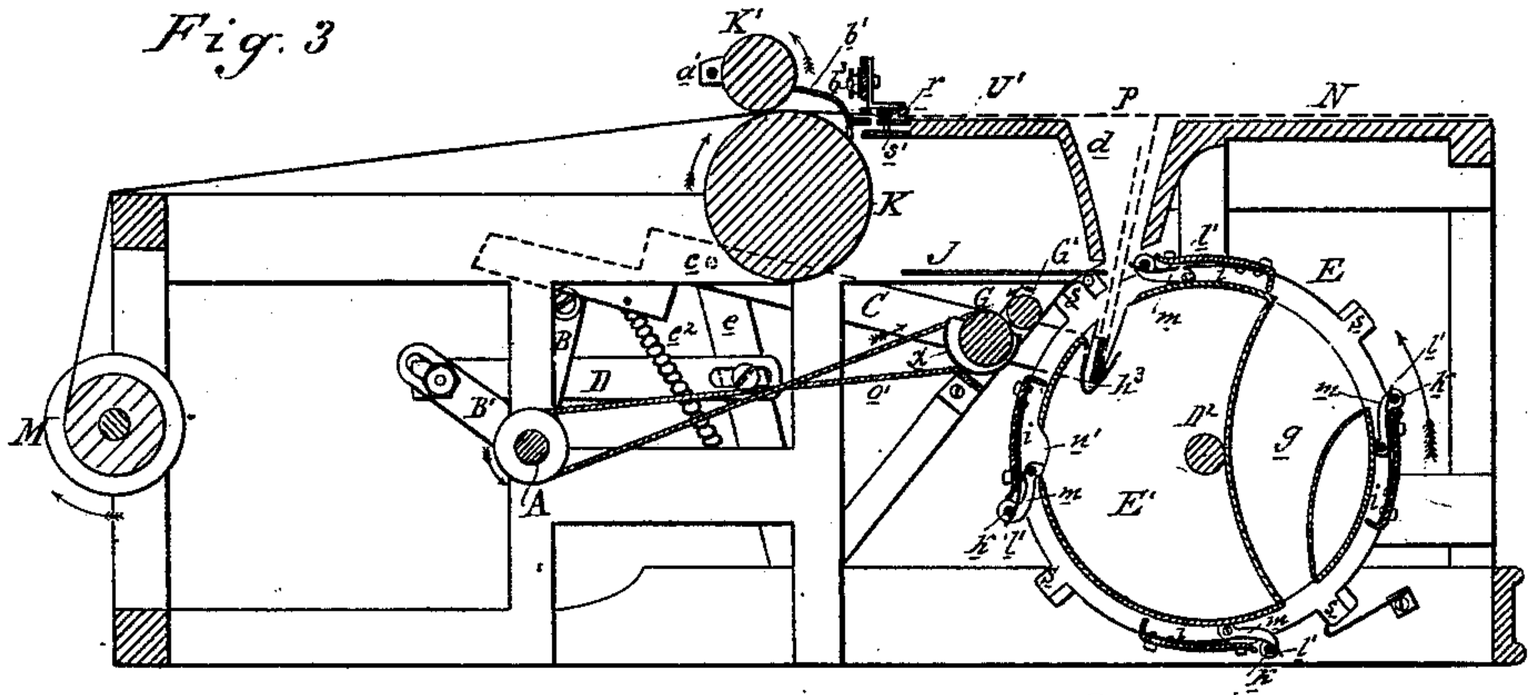


Fig. 4

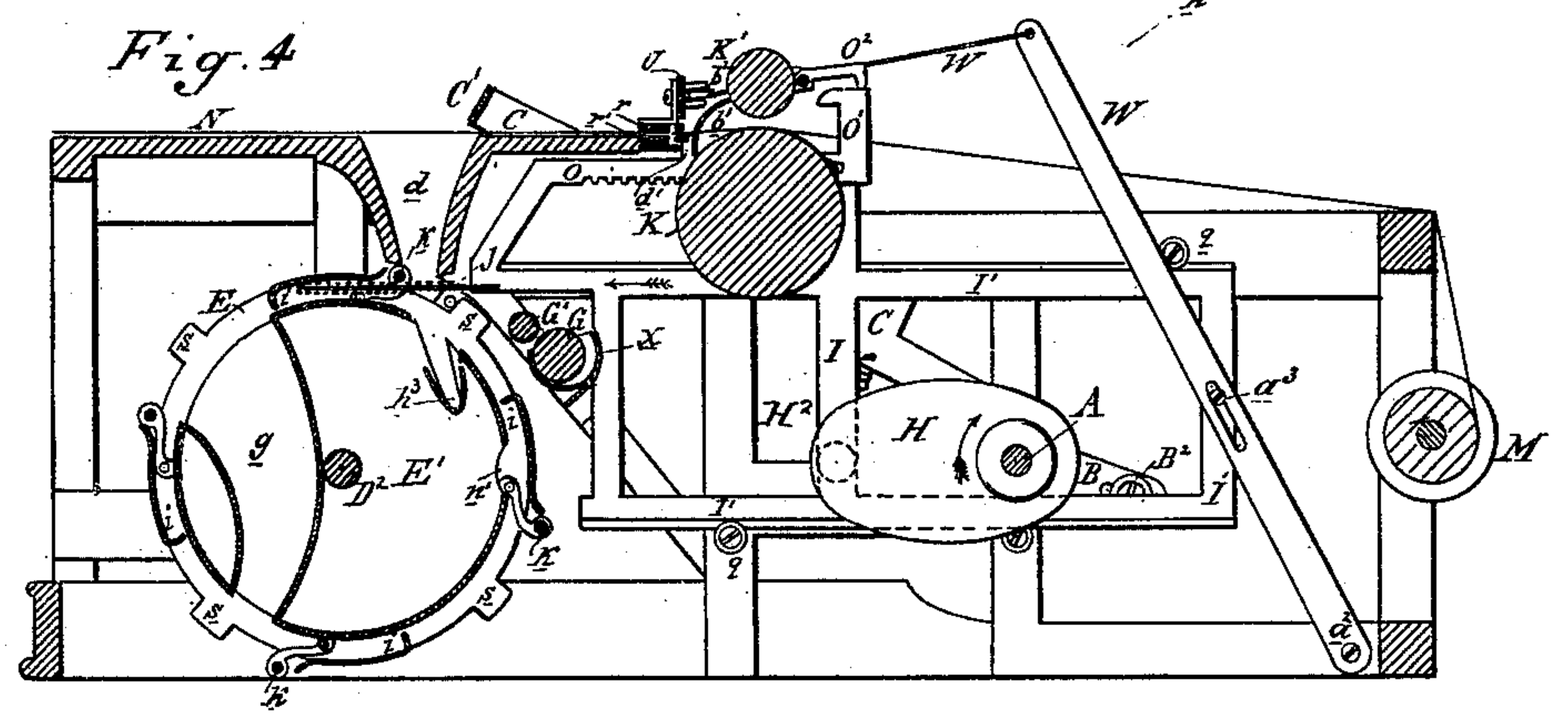


Fig. 5

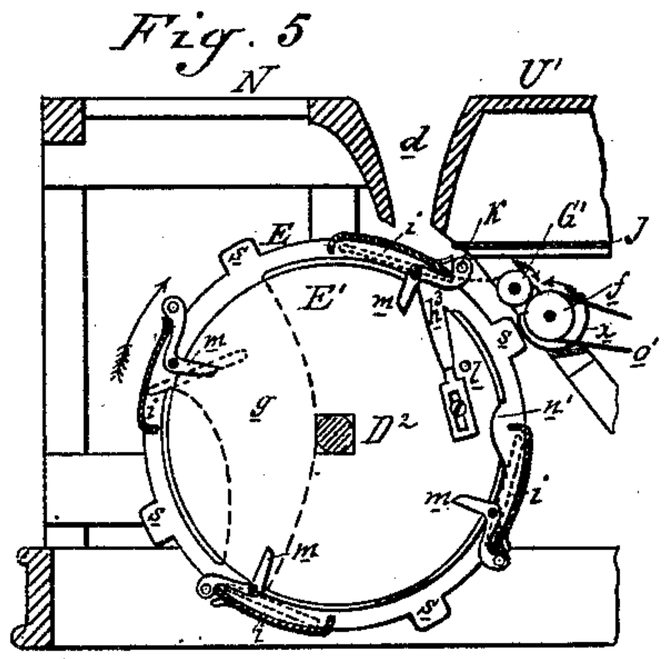
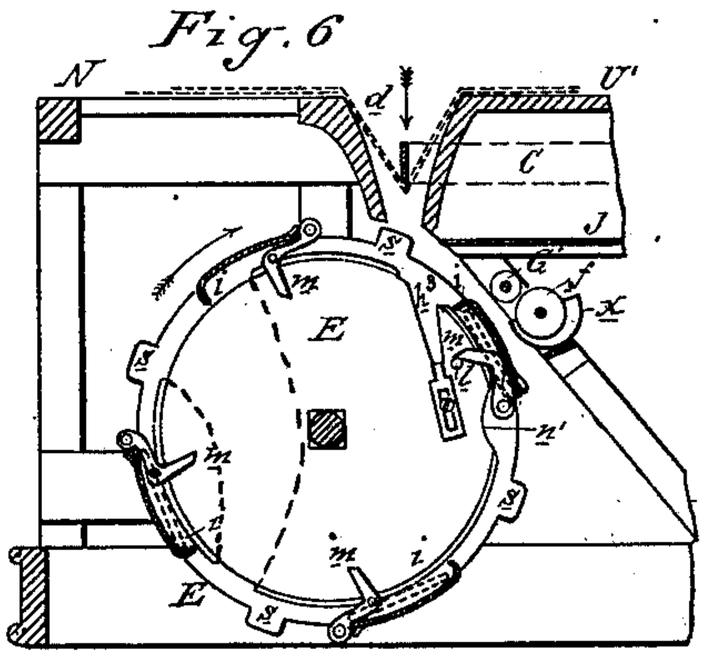


Fig. 6



Attest:
A. Barthel
N. S. Sprague

Inventor:
W. R. Cole
N. Eisenlord
By Atty
Thos. S. Sprague

3 Sheets—Sheet 3.

W. R. COLE & N. EISENLORD.

Paper-Folding Machine.

No. 222,245. **Patented Dec. 2, 1879.**

Fig. 7

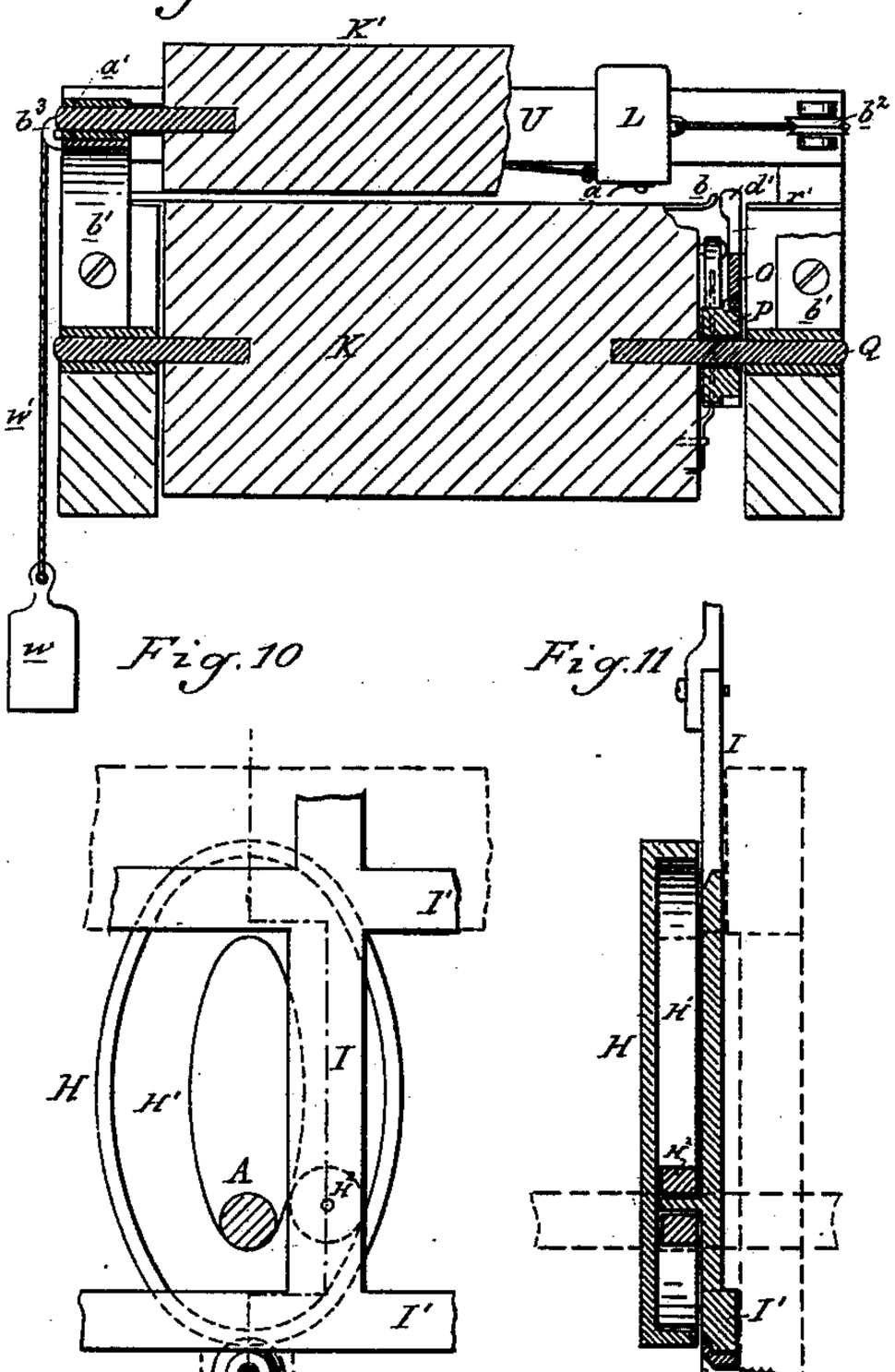


Fig. 8

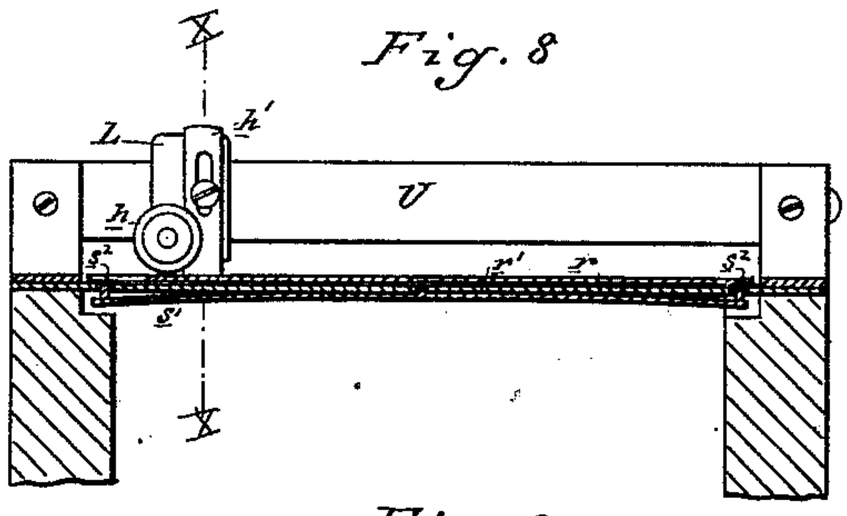


Fig. 9

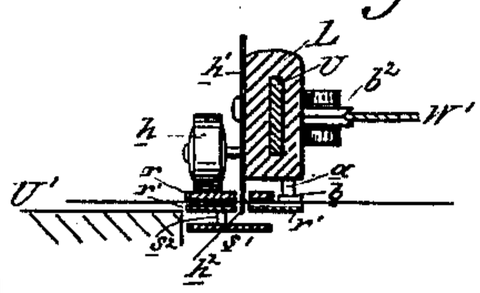


Fig. 10

Fig. 11

Fig. 12

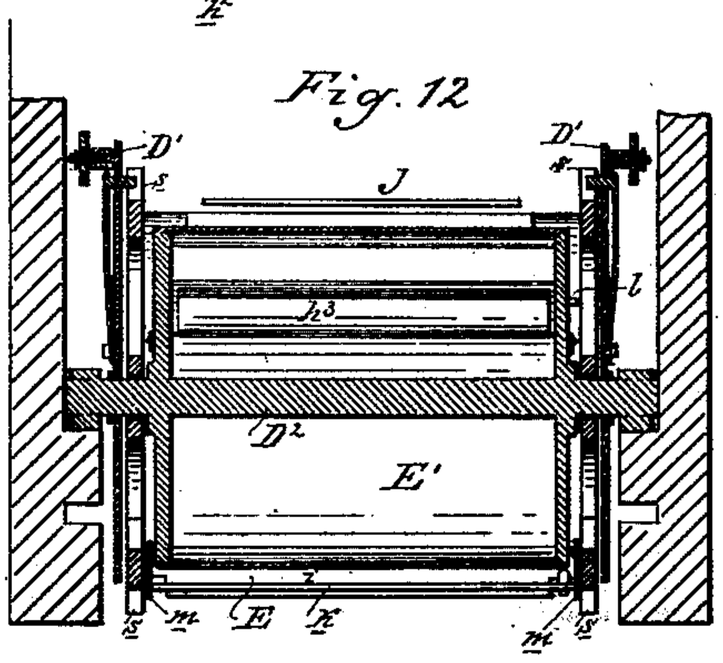


Fig. 13

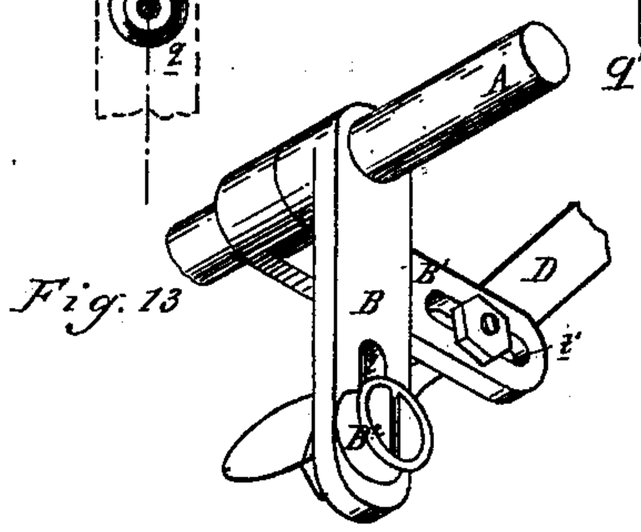
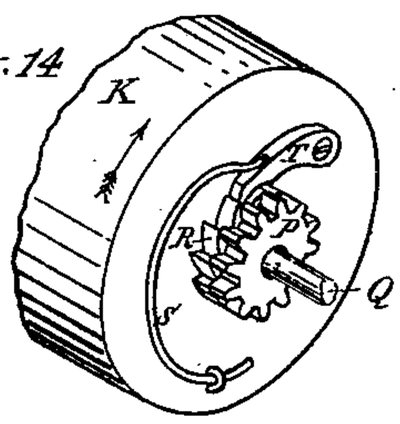


Fig. 14



Attest:
A. Barthel
H. S. Sprague

Inventor:
W. R. Cole
N. Eisenlord
By Atty.
Thos. S. Sprague

UNITED STATES PATENT OFFICE.

WILLIAM R. COLE AND NATHAN EISENLORD, OF DETROIT, MICHIGAN; SAID COLE ASSIGNOR OF ONE-HALF OF HIS RIGHT TO SAID EISENLORD.

IMPROVEMENT IN PAPER-FOLDING MACHINES.

Specification forming part of Letters Patent No. **222,245**, dated December 2, 1879; application filed September 18, 1878.

To all whom it may concern:

Be it known that we, WILLIAM R. COLE and NATHAN EISENLORD, of Detroit, in the county of Wayne and State of Michigan, have invented an Improvement in Paper-Folding Machines, of which the following is a specification.

The nature of our invention relates to certain new and useful improvements in machines constructed to be used as auxiliaries to the folding-machines ordinarily employed to fold newspapers, as they come from the press, into convenient size for handling. To inclose such papers in single wrappers, pasted and ready for mailing, is the design we have in view.

The invention consists in devices for accomplishing the following results, such devices all being operated by and from one main driving-shaft. First, to cut the wrapper of any required length from a roll of suitable paper; second, to fold the same with the paper within; third, to paste the overlapping edge of the wrapper; fourth, to fold over such pasted edge; and, fifth, to deliver the paper inclosed within the wrapper ready for mailing; all these devices being constructed and arranged to operate substantially as more fully hereinafter described.

Figure 1 is a perspective view of our machine from the crank side. Fig. 2 is an elevation of the opposite side. Figs. 3 and 4 represent elevations of the two halves of the machine when cut vertically through its longitudinal center line. Figs. 5 and 6 represent elevations obtained by cutting vertically and longitudinally between the outer revolving and the inner stationary part of the drum. Fig. 7 is a vertical longitudinal section through the paper-carrying rollers, one of them being partially broken away to show the cutter-bar and head. Fig. 8 is a front elevation of the cutter-head and knife. Fig. 9 is a cross-section of Fig. 8, on the line *x x* in that figure. Fig. 10 is an elevation of the eccentric or cam and its connections for changing the rotary motion of the driving-shaft to a vertical and longitudinal motion, to give the necessary motions to various parts of the machine. Fig. 11 is a vertical central cross-section of the same. Fig. 12 is a vertical longitudinal section through the center of the drum, showing its outer rotating and inner stationary shell. Fig. 13 is a view of a section of the main crank, showing the arm that gives motion to the folding-bar. Fig. 14 is an end view, in perspective, of the larger paper-carrying roller, shown in Fig. 7.

In the accompanying drawings, which form a part of this specification, A represents the main driving-shaft, suitably journaled in the two sides of the machine, and at each end it is provided with two crank-arms, B B′. Upon the inner faces of the revolving arms B are journaled, by means of a bolt passing through the slot *t*, grooved friction-rollers, B^2, Fig. 4. These rollers strike the free ends of the levers C, which at their upper ends are coupled together by the folding-bar C′, so that the latter (the lever being pivoted at *c*) has an intermittent and nearly vertical motion at each revolution of the main shaft. The other pair of crank-arms, B′, are connected by means of the pitmen D to the levers *e*, the lower ends of which are pivoted at *e′* to the sides of the frame.

The pitmen D form adjustable connections between the crank and the lever by means of wrist-pins and slots in the usual way. These levers *e* are pivoted at their upper and free ends to the levers C^2, and these levers are in turn pivoted to the springs D′, which are journaled on the shaft D^2 of the drum.

At every revolution of the main shaft A, by means of the pitmen D and their connections, an intermittent partially-rotating motion is given to the outer drum E by the spring engaging with the studs *s*, Fig. 12.

The crank-arms B′ have slotted connections with the pitmen for adjusting the stroke of the same, and the pitmen D have slotted connection with the pivoted levers *e*, for the purpose of giving an intermittent partially-rotating motion of longer or shorter duration to the drum E.

A cam, H, is rigidly secured to the main shaft. This cam is provided upon its face with a groove, H′, within which moves the wheel H^2, which is pivoted to the vertical bar

I of the frame I′ for the purpose of changing the rotary motion of the shaft to a reciprocating motion of the frame I′. To the top of the frame I′, which is held in place by the small guide-wheels *q*, is secured the rack-bar O, which engages with the pinion P upon the shaft Q of the larger paper feed-roll, K. To this pinion P is secured the ratchet R, Fig. 14, which is provided with the pawl or dog T and spring S, the whole of these parts so arranged that in the forward motion of the rack-bar a corresponding rotary motion is given to the feed-roll, which remains stationary upon the reverse motion of the rack-bar. To the outer end of this rack-bar is adjustably secured a dog, O′.

Suitably journaled in boxes *a′*, Figs. 3 and 4, is the smaller paper feed-roller, K′. These boxes are secured to the spring-supports *b′*, which are secured in turn to the frame of the machine. To one of these boxes is secured the horizontally-projecting dog O^2. These spring-supports *b′* are designed to hold the smaller paper feed-roller in contact with the larger one when the latter is being moved by the rack-bar, the friction of the two rollers drawing the paper from the roller M between said paper feed-rollers until the forward movement of the rack-bar O compels its dog O′ to pass under the dog O^2, which lifts the smaller feed-roller from its contact with the larger one, the adjustability of the dog O′ being designed to govern the length of paper-feed between the rollers.

A lever, W, is pivoted at its lower end to the frame at a^2, and by means of the slotted connection a^3 is also pivoted to the frame I′, and to its upper end is secured the cord W′. The opposite end of this cord, passing around the grooved sheave b^2, is secured to the cutter-head L, which traverses the tranverse bar U, suitably secured at its ends to the top of the table U′ of the machine. A weight, *w*, attached to the cord W′, which passes over a proper grooved sheave b^3 and is secured to the cutter-head L, draws said cutter-head rapidly across the machine when it is released from the engagement of the spring *a* with the projection *b* by the dog *d′* on the rack-bar O. This dog *d′* projects upward from the rack-bar O, and passes under the spring *a*, releasing it from its engagement with the stop *b*. At this time the lever W has been projected forward, as shown in Figs. 2 and 4, until the cord W′ is slackened.

As the frame I recedes from its forward motion it carries the lever W back to its perpendicular position, and, by means of the cord W′, returns the cutter-bar to its original position and re-engages the spring *a* with the projection *b*.

To the cutter-head, and in proper position, is secured a suitable knife, *h′*. The paper projected through between the feed-rolls is carried between the upper and under guide-plates, *r r′*, the latter or lower one being rigidly secured at each end to the frame of the machine, while the former or upper guide-plate *r* rests upon downward projections s^2. These projections pass down through the under guide-plate and rest upon the ends of a spring, *s′*, secured at its center to the under guide-plate. This spring raises the upper guide-plate to give a free passage to the paper.

To the cutter-bar is secured a pressure-wheel, *h*, which, when the cutter-head commences its travel across the machine, bears upon and presses down the upper guide-plate to hold the paper smooth while being acted upon by the cutter *h′*, which passes through the slot h^2 in the upper and lower guide-bars for that purpose.

The wrapper or paper P, which is to be cut off, is projected forward across the vertical opening *d* in the top of the machine, and across the narrow table, N, until the end of the wrapper projects beyond the edge of the paper to be inclosed. The newspaper to be inclosed is then laid on the wrapper, so that its center will be immediately over the center of the opening in the table top, when the folding-bar C′, operating as already described, strikes the center of the paper and carries it folded with the underlying wrapper, as shown in dotted lines, Fig. 3, through an opening in the drum E, into the pocket h^3 in the inner drum, E′, when the folding-bar is returned to its original position by means of the springs e^2, after the free ends of the levers C have been released from their engagement with the arms B. Projecting horizontally forward from the frame I′ is the folding-plate J, which is projected forward by the forward motion of said frame against the cross-center of the folded paper and wrapper, the lower portion of which is within the pocket, as described. This movement of the plate forms a transverse fold in the paper, and carries it into one of the pockets *i* formed between the inner stationary drum E′, and the outer rotating drum, E. In the return motion of the frame I the plate J is withdrawn, leaving the paper folded within the wrapper in the pocket, as described, with the end of the wrapper projecting beyond the paper. In the retrograde motion of the frame I′, an intermittent quarter-turn is given by the devices already described, to the outer drum E, which brings the projecting end of the wrapper into contact with the face of the pasting-roller G′, which roller receives paste from the larger paste-roller G, which revolves in the paste-box *x*, which is driven from the pulley *f′* on the main shaft by means of the cross-belt *o′*, and a pulley, *f*, on the end of the latter named paste-roll. This movement is shown in detail in Fig. 5, where the paper inclosed within the wrapper is shown in the pocket in dotted lines, with the projecting end of the wrapper in contact with the paste-roller G′. Before the conclusion of the quarter revolution of the outer drum, E, the curved dog, *m*, rigidly secured to one end of the rod *k*, which extends across the face of the pockets *i*, is brought into contact with the pin

l, which compels said rod to fold over the pasted edge of the wrapper, and carries it into the slot *n'* in the inner drum, when the spring *l'* throws the curved dog *m* into its original position, after being released from the stud *l* in the further rotation of the outer drum. In the conclusion of the quarter rotation of the outer drum the outer side of the pasted edge of the wrapper is brought into contact with the lower edge of the slot *n'*, and compressed against the body of the package.

The paper thus inclosed within the pasted wrapper remains in the pocket during the succeeding two intermittent quarter turns of the outer drum, during which time the hereinbefore-described movements have been performed two further successive times. At the commencement of the next successive intermittent quarter revolution, the package falls into the opening *g* in the inner drum, and is delivered therefrom at the bottom.

It will be seen that all the various motions of the machine are brought into action by the revolution of the main driving-shaft, and that at each revolution of this shaft the wrapper is cut from a continuous roll of paper. The newspaper, as it comes from the ordinary folder, receives the two additional folds necessary to reduce it to the size usually employed when mailed in single wrappers, and, while being thus folded, is enveloped in the wrapper, which is pasted, folded over and secured, ready for addressing and mailing. It will be further seen that the motions of the machine are intermittent, allowing each of the various steps in the process to successively follow, as required.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a paper folding and wrapping machine, the combination, with the rotating drum, provided with a series of retaining-pockets, the vibratory folding-bar adapted to fold the papers within the wrappers and force them downwardly into a fixed pocket in a stationary drum, and a horizontally-moving folding-plate for giving the papers and wrappers another fold, and thrusting them into the retaining-pockets of the rotating drum, substantially as described.

2. In a paper folding and wrapping machine, the combination, with the folding devices, of a stationary drum, having a fixed pocket, into which the papers and wrappers are successively folded, and provided with a throat for the discharge of the wrapped papers, and an outer rotating drum, having a series of pockets, into which the papers and wrappers are thrust by the horizontal folding device, the said papers and wrappers being retained in such pockets until the projecting edge of each wrapper has been pasted and secured, substantially as described.

3. In a paper folding and wrapping machine, the combination, with the folding and pasting devices, of the stationary and rotating drums, substantially as described, the latter having a series of retaining-pockets, and the series of rods operated by dogs across the mouths of said pockets, for the purpose set forth.

WILLIAM R. COLE.
NATHAN EISENLORD.

Witnesses:
H. S. SPRAGUE,
A. BARTHEL.