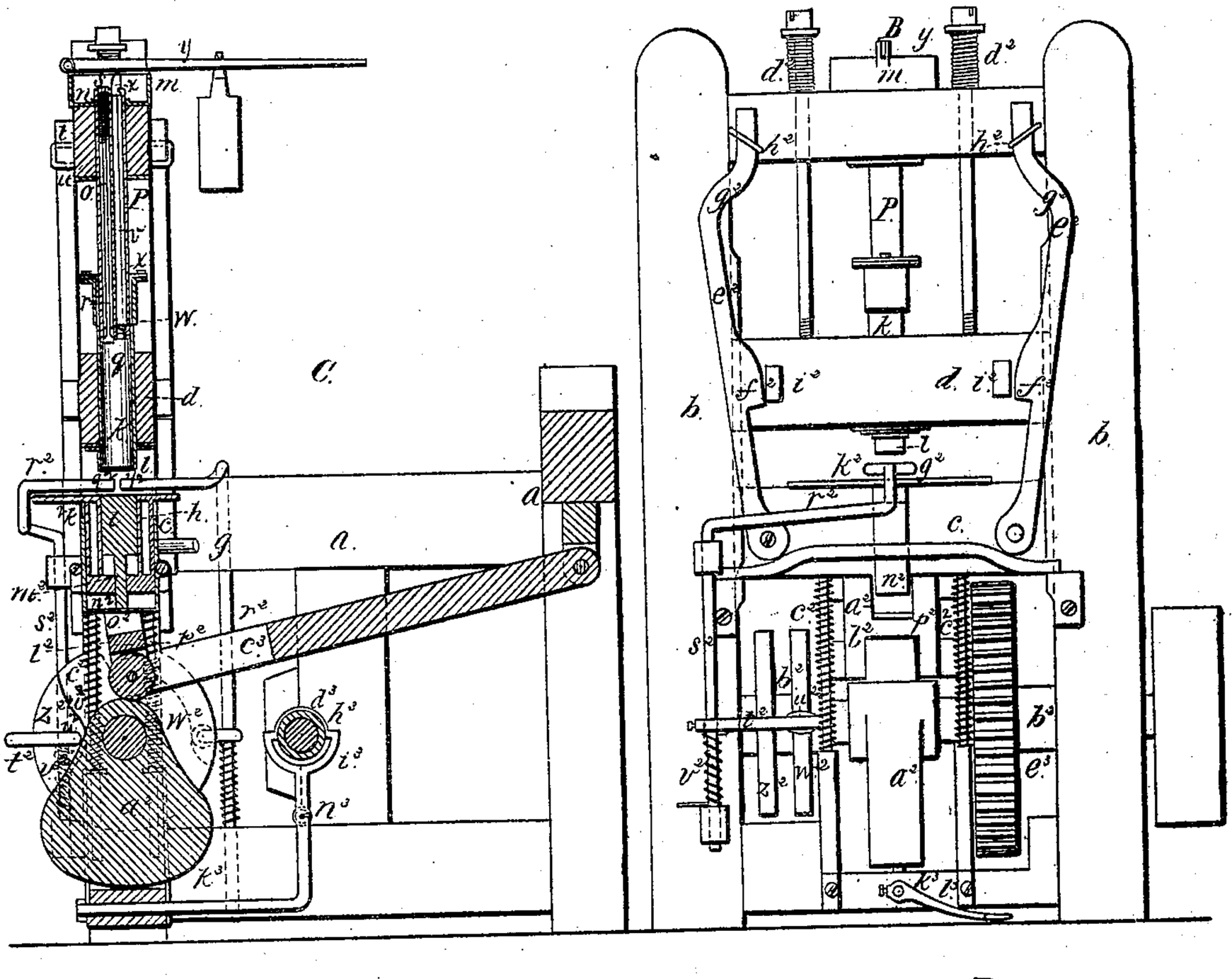
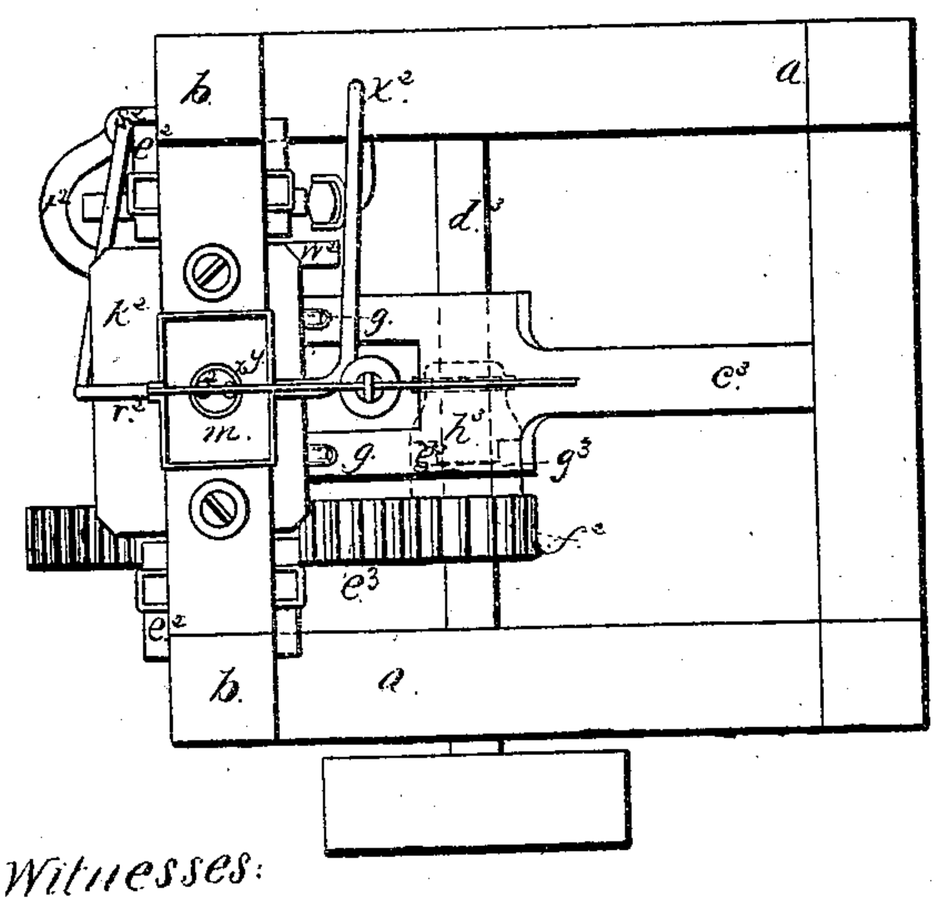
B. F. Quimby.

Paper Box Mach.

No. 89,433. Patented Apr. 27, 1869.



A.



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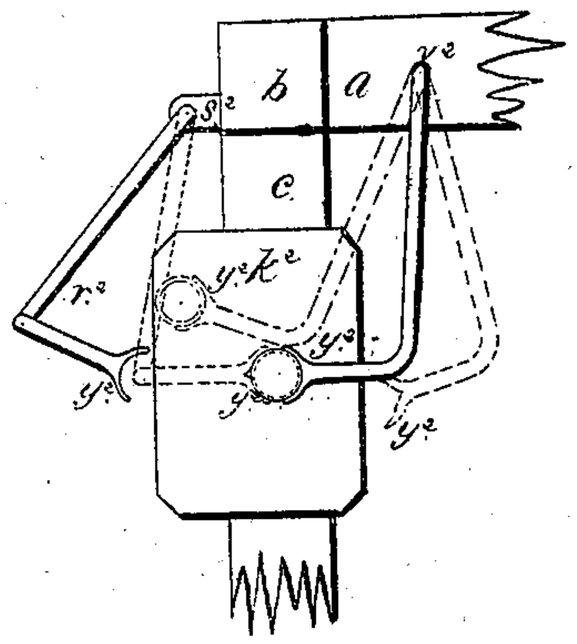

Witnesses:

S. B. Kidder.
M. M. Frothingham.

Inventor.

B. F. Quimby
by his Attys
Crosby Halstead & Gould

UNITED STATES PATENT OFFICE.

B. F. QUINBY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HIMSELF AND G. W. QUINBY, OF SAME PLACE.

IMPROVED MACHINE FOR MAKING PAPER BOXES.

Specification forming part of Letters Patent No. **89,433.** dated April 27, 1869.

To all whom it may concern:

Be it known that I, B. F. QUINBY, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in the Manufacture of Boxes and other Hollow Articles from Paper-Pulp; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

The invention relates particularly to the manufacture of that class of paper boxes made of pulp molded into box form, with reference to the final process of finishing such boxes (or their covers) by applying pressure and heat to their surfaces; and the invention consists in an organization by which the box-blank, while in a soft and moist condition, is acted upon in a matrix by an expanding plunger, to impart its finished form, and in the details of construction of a press (and mechanism adjunctive thereto) for treating such boxes to condense the fiber and give to each its ultimate form and rigidity.

The drawings represent a mechanism embodying my invention.

A shows a plan of the machine; B, a front elevation thereof; C, a vertical central section.

a denotes the frame-work, between two uprights, *b b*, of which are two reciprocating cross-heads, *c d*, the lower one, *c*, of which consists of a steam box or case, or is provided with a steam box or case, into and from which steam-pipes *g g* lead, said steam-box surrounding a tube or cylinder, *h*, in which is a piston, *i*, the top of which, with the inner surface of the tube above it, forms (when the cross-head *c* is raised) a matrix for receiving and holding the blank to be pressed. The upper cross-head *d* carries a reciprocating tube or hollow cylinder, *k*, which extends through the cross-head, as seen at C, its lower end (projecting beyond the bottom of the cross-head) being covered by an elastic bag, *l*. On the upper cross-beam *f* of the frame A is a water-containing cistern or tank, *m*, from the bottom of which an outlet, *n*, opens into a tube, *o*, which extends through a hollow stationary piston, *p*, which passes through the beam and projects down into the cylinder *k*, as seen at C. The tube *o* passes through the piston and opens into the cylinder *k*, the opening being provided with a valve, *q*, (below it,) attached to the lower end of a rod, *r*, which rod, passing through the tube, has at its upper end a nut, *s*, under which is a spring, *t*, the lower end of which rests on a stationary lip or flange, *u*, while the upper end, pressing against the nut, tends to hold the valve up to its seat or the bottom of the tube. Another tube, *v*, also extends through the piston from the tank *m*, a safety-valve, *w*, resting upon a valve-seat formed within the lower end of the tube, as seen at C, this valve being upon the end of a rod, *x*, upon whose upper end rests a weighted lever, *y*.

The upward movement of the lower reciprocating cross-head or steam-box is produced by a cam, a^2, located on a shaft, b^2, and its return movement is effected by a series of springs, c^2. The upper cross-head is raised by the lower one, and its downward movement is effected by springs d^2. On one end or on each side of the lower cross-head are hung two latch-bars, e^2, each having a latch, f^2. The upper end of each latch-bar is bent, as seen at g^2, and extends through a staple or guide, h^2, fixed to the upright *b*. Projecting from the lower cross-head are two studs or projections, i^2, and when the cross-head *c*, in rising, strikes the cross-head *d*, the latch-bars are moved inwardly by the guides h^2, and the latches are brought over the studs i^2, thus locking the cross-heads together during their continued upward movement. When the cross-heads descend, the lower one is released from the upper, when the latch-bar bends reach the guides h^2.

The operation upon the box or box blank or cover is as follows: The parts described being in their normal position, as seen in the drawings, (the top of the piston *i* flush with the top of the cylinder *h*, and the cross-heads fully separated,) the wet or semi-pulpy semi-formed box or cover is slid over the table or plate k^2 (in line with the top of the cylinder) until it rests upon the top of the piston *i*. The tank *m* being charged with water, said water will have flowed into the cylinder *k* through

the tube *o*, filling said cylinder up to the bottom of the piston *p*.

As the shaft b^2 begins to rotate, the cam acts upon a roller-frame, l^2, hung to the lower cross-head *c*, and raises the cross-head and its cylinder *h*. During the first part of such rise the piston *i* remains stationary, a spindle, m^2, depending from this piston, resting upon a plate, n^2, extending through an opening, o^2, in the roller-frame, the piston remaining stationary until the surface p^2 of the frame strikes the plate. This movement of the cylinder relatively to the piston causes the cavity or matrix to be formed by the cylinder and piston, into which matrix the pulpy box or blank being received by the movement of the cylinder, the cylinder, piston, and box rise together, and the bag-covered end of the cylinder *k* enters the box in the matrix.

When the top of the cylinder *h* strikes the upper cross-head *d*, the latter, with its cylinder *k*, will rise with the cylinder *h* and piston *i*, and the latches f^2 will lock over the projections i^2. As the cylinder *k* rises, the piston *p* is forced into it and against the column of water therein, and the pressure of the water expands the elastic bag against the box surrounding it, forcing the sides and bottom of the box against the wall of the cylinder *k*, and the top of the piston *i*, which surfaces, being heated by the steam-box, dry the box while under pressure, the pressure and heat combined setting the box into form, so that when released from the matrix it shall have reached its ultimate or perfect shape.

By means of the safety-valve and lever and weight, the pressure of the water may be regulated, excess of such pressure throwing up the valve, and allowing water to escape back into the tank.

The latches prevent the upper cross-head from yielding in an upward direction or away from the lower cross-head while the pressure is applying. The box having been thus pressed, the continued rotation of the shaft first drops both cross-heads, releasing the box from the water-pressure, and the lower cross-head then drops from the upper, releasing the matrix from the elastic piston, and the box from the matrix.

To carry each box over, upon, and off from the piston *i*, a mechanism is employed as follows: q^2 denotes a pair of fingers projecting from an arm, r^2, at the top of a rod, s^2, rocking in bearings at the front of the frame *a*. Near the bottom of this rod is an arm, t^2, carrying a roll, u^2, which, by means of a spring, v^2, is held up to the edge of a cam, w^2, on the shaft b^2. On the opposite side of the uprights *b* is another vertical rod, x^2, turning in similar bearings, and having at its top a similar arm, from which project similar fingers y^2, this rod also having a roll-bearing arm, and a spring which holds such roll against the periphery of the cam z^2.

When a box is to be pressed, and before the parts commence their movements, or while they are in normal position, the fingers y^2 are in the position shown in full black lines at D, in which position, if a box-blank is pushed up against and between them, it will be centered upon the piston *i*, while the fingers q^2 stand out at the side of the table k^2, as seen in full black lines at D. The box to be treated is now placed on the edge of the table in the path of the fingers q^2, and as motion is imparted to the shaft, the cam-recess b^3 comes against the roll u^2, and the spring v^2 causes the rod to turn, the fingers q^2 sliding the box over into the fingers y^2, as seen at D. The box-blank having been thus disposed, each cam forces out its arm, causing each pair of fingers to retreat, leaving the blank in position to be received into the matrix.

The box having been pressed into form, and the lower cross-head having again reached its normal position, the cam w^2 causes the fingers y^2 to advance against the box and push it to the front of the table or plate *k*, as seen at D, in position to be readily removed by the operator, the fingers then returning to their normal position, as seen at D, ready for the next box to be brought up against them by the fingers q^2.

It will thus be seen that the fingers y^2 have two functions—first, as a stop against which to bring the box to center it over the piston *i*, and next as a carrier to remove the formed box, while the fingers q^2 act to carry the blank in against the fingers y^2.

The roller-frame l^2 may be kept in position while being lifted by the cams, by connecting it to the rear part of the frame *a* by a link, c^3, as seen at C.

The shaft b^2 is represented as geared to a driving-shaft, d^3, by gears e^3 f^3. The gear f^3 is loose upon the shaft d^3, and has a clutch, g^3, by which it is connected with a sliding clutch-pulley, h^3, rotating with the shaft d^3. With the clutch-pulley h^3 a shipper-fork, i^3, connects, this shipper-fork extending from a shaft, k^3, journaled in the frame *a*. At the front of the shaft is a pedal, l^3, by depressing which the clutch-pulley is connected with the gear-clutch, the pedal being fastened down by a button, m^3. Upon turning up this button a spring, n^3, instantly draws back the slide-clutch, thus causing arrest of movement of the shaft b^2 whenever necessary, as will be readily understood.

In making very small boxes, the water may be let into the cylinder *k* under the piston *p*, instead of carrying it through the tube *o*.

I claim—

1. The combination of the reciprocating matrix-cylinder *h* and its piston *i* with the reciprocating-cylinder *k* and its elastic bag or former *l*, expanded by fluid-pressure, substantially as described.

2. In combination with the hollow piston *p*, the water-containing tank *m*, the pipe *o* and its valve *q*, and the tube *v* and its safety-valve *w*, arranged to operate substantially as described.

3. In combination with the reciprocating matrix-cylinder and its piston *i*, and the piston or plunger cylinder *k*, the fingers q^2, for carrying the blank into position over the piston *i*, and the fingers y^2, for arresting the blank and for removing the finished box, substantially as described.

4. In combination with the matrix or cylinder *h*, elastic bag or former *l*, fluid-cylinder *k*, and piston *p*, the mechanism for locking the parts together, substantially as described.

5. In combination with the matrix-cylinder *h*, the steam-box *c*, for imparting heat thereto, substantially as described.

6. A machine so organized that a semi-pulpy or moist and soft box-blank is operated upon, while in a matrix, by an expanding plunger, to perfect its shape, substantially as described.

B. F. QUINBY.

Witnesses:
FRANCIS GOULD,
S. B. KIDDER.