J. D. COTTRELL.

CLOTH-FOLDING MACHINE.

No. 182,171. Patented Sept. 12, 1876.

Fig. 1.

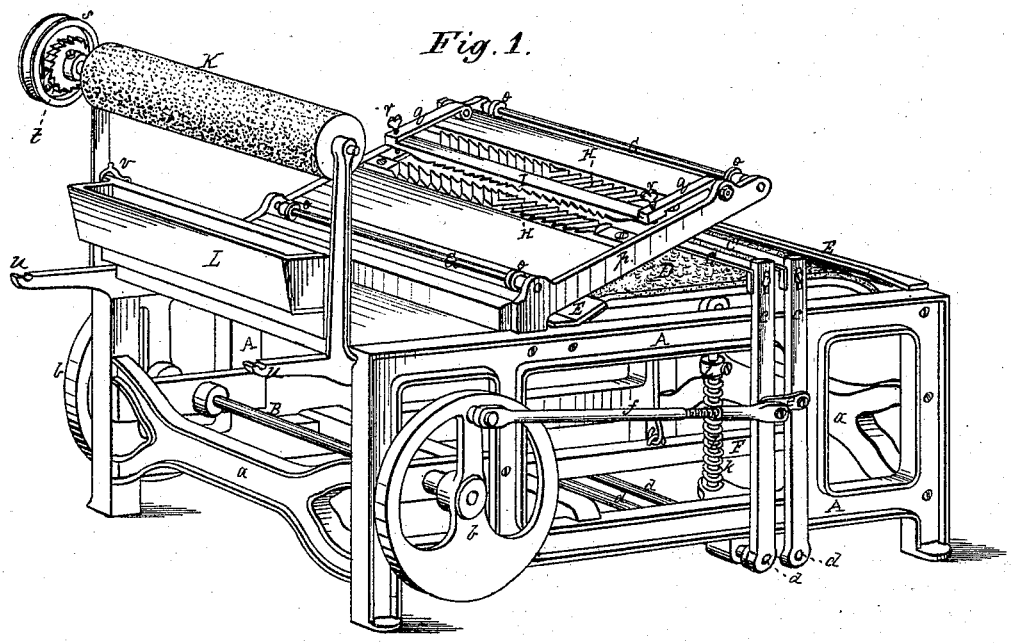
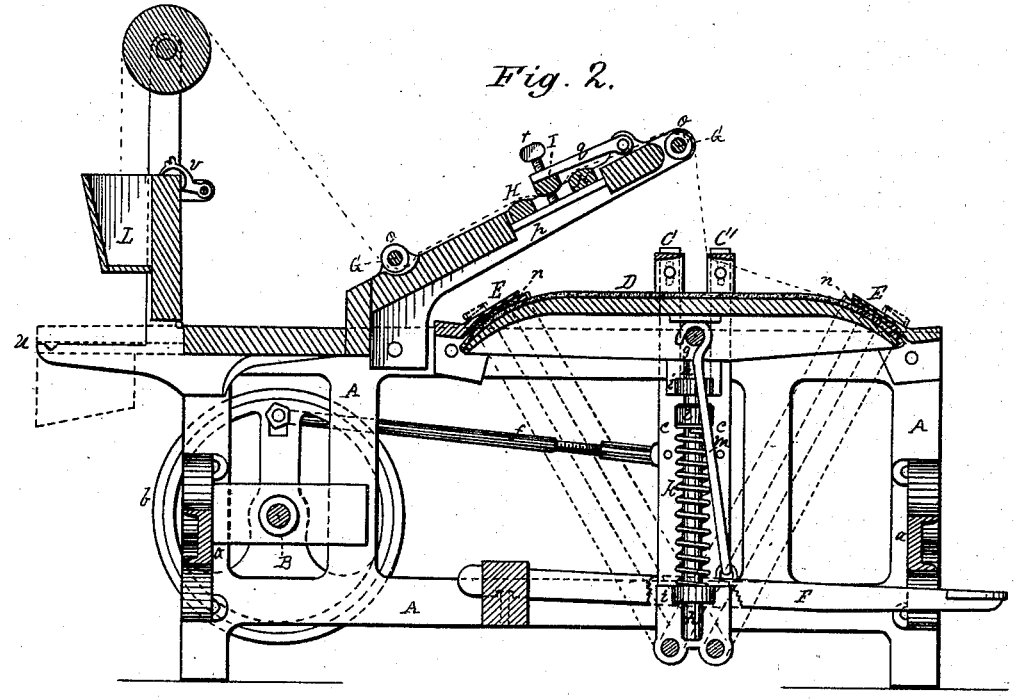


Fig. 2.



Witnesses
Philip F. Larner
A. B. Caldwell

Inventor:
Jesse D. Cottrell,
By Wm. McWood
Attorney

UNITED STATES PATENT OFFICE.

JESSE D. COTTRELL, OF PAWTUCKET, RHODE ISLAND.

IMPROVEMENT IN CLOTH-FOLDING MACHINES.

Specification forming part of Letters Patent No. **182,171**, dated September 12, 1876; application filed May 23, 1876.

To all whom it may concern:

Be it known that I, JESSE D. COTTRELL, of Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Cloth-Folding Machines; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description of my invention.

My invention, in part, consists in the combination, with suitable jaws, of a folding-table centrally mounted on a transverse shaft, which moves vertically with the table, and is supported by springs, whereby the pressure of the table against the jaws will be increased in proportion to the thickness of folded fabric interposed between the table and the jaws.

A quadrant lever and weight has heretofore been employed in a similar combination; but the lifting-power of the weight and its quadrant lever applied for compressing the folded fabric between the table and the jaws is not variable, as is the case of the springs applied in accordance with my invention.

As heretofore, I employ a holding-jaw clothed with elastic vulcanized rubber, whereby a firm hold is had upon the fabric without liability of such injury thereto as in practice results from the use of teeth and corrugated surfaces as heretofore commonly employed in this connection. My invention also consists in the combination, with a folding-table centrally mounted, and rocking on a transverse shaft, which is supported by springs, and a pair of suitable holding-jaws, of a parallel pair of folding-knives, each of which is arranged to operate with the table and a holding-jaw, is separately and rigidly mounted on a pair of pivoted standards, and which are simultaneously vibrated from jaw to jaw and over the table, whereby the fabric passing between the edges of the two knives is delivered alternately to each of the jaws and folded therein.

In folding-machines as heretofore constructed I am aware that similar folding-knives have been employed, in combination with jaws lifted by cams, and a table susceptible of being gradually lowered by means of gearing for providing for the increasing bulk of the folded fabric between the jaws and the table.

My invention further consists of the combination, with the folding mechanism, of tension bars, two of which are stationary, and co-operate with an intermediate bar, which is vertically adjustable, whereby a proper tension on the fabric is readily maintained. The faces of the bars may be scored diagonally, as hereafter described, for the purpose of spreading and smoothing the fabric. My invention also consists in the combination of folding mechanism and a delivery or sand roll, with a roll-pulley connected with the sand-roll by a ratchet and pawl, whereby the roll may be driven by its pulley and yet be free to be rotated while the fabric is drawn over the roll preparatory to starting the machine.

To more particularly describe my invention, I will refer to the accompanying drawings, in which—

Figure 1 represents, in perspective, a machine embodying my improvements. Fig. 2 represents the same in longitudinal central vertical section.

A denotes the side plates, and *a* the end plates, which constitute the frame of the machine. B denotes the driving-shaft, mounted in boxes supported by the side plates near one end of the machine. At each end of this shaft is a crank-wheel, *b*, which is balance-weighted, as shown. The machine can be driven by a belt applied to one of the crank-wheels, or to an additional shaft (not shown) connected by gearing to the driving-shaft B. C and C′ denote reciprocating folding-knives, which have a length somewhat greater than the full width of the machine. Each folding-knife is rigidly, but adjustably, mounted on two standards, *c*, which are in turn mounted on a transverse rock-shaft, *d*, at the bottom of the machine. The operative edges of the two knives are coincident, and sufficiently separated from each other to afford between them the free reception of the fabric to be folded. At each side of the machine the standards *c* of both knives are linked together, as at *e*, and are connected on each side by a pitman, *f*, with a crank-wheel, *b*. The rotation of the main shaft imparts a reciprocating movement to the knives, and each knife moves in the arc of a circle, of which its respective rock-shaft *d* is the center. The pitmen *f* are connected

to the crank-wheel by a crank-pin, which is radially adjustable in the crank-wheel, and it is also susceptible of being shortened or lengthened by means of a screw-thread thereon and a tapped sleeve, as clearly shown.

D denotes the folding-table. It is nearly flat on top, and is preferably clothed with felt. At each end the table is curved downward, for affording a proper surface for contact with the mass of folded edges of a fabric, when interposed by the knives between the curved ends and the holding-jaws E, which are attached to the frame of the machine, and have faces which correspond, generally, with the curved surface of the table. In practice, these jaws are adjustably mounted upon the frame of the machine. The folding-table is mounted on a central transverse rock-shaft, *g*, which is mounted upon two vertical rods, *h*, each guided in two bearings, *i*, which project from the inner sides of the frame. Each vertical rod *h* is encircled by an expansive spiral spring, *k*, which has a support upon the lower stationary guide-bearing *i*, and an abutment at its upper end against a collar, *l*, which is secured to the rod by a set-screw for purposes of adjustment. As a result of this construction, it will be seen that either end of the table may be deflected, and that the rock-shaft and springs afford a fulcrum whereby the opposite end of the table will be forced upward with a pressure corresponding with the downward pressure expended in deflecting. It will also be seen that, normally, the pressure of the springs will be equally distributed, so that both ends of the table will bear with uniformity against the coincident surfaces of the holding-jaws. For bodily depressing the table, a treadle, F, is employed, which is connected centrally to the rock-shaft *g* by a rod, *m*, as clearly shown.

The holding-jaws of folding-machines, as heretofore constructed, have been provided with longitudinally-corrugated surfaces, or with teeth, variously formed and arranged, for securing control of the fabric. In practice, such machines are liable to, and do often, injure the fabric more or less by tearing it. A novel feature of my invention consists in clothing the contact-surface of the holding-jaw with elastic vulcanized rubber, as at *n*, which results in securely holding the fabric without any liability of injuring it.

G, in each instance, denotes a guiding-rod. The cloth passes on the way to the folding-knives beneath the lower rod and over the upper one, and, as heretofore, they are provided with guiding-collars *o*, one at each end of the rod. It is of great value that the cloth, as fed, should be maintained at proper tension. For attaining this object I have devised a simple and readily-adjustable device, which not only secures desirable tension, but also performs the function of laterally smoothing the fabric. The guiding-rods G are mounted on a pair of inclined standards, *p*, which are supported by the side plates of the machine. Between the two rods is my tension device. It is composed of two parallel stationary transverse bars, H, and a movable bar, I, which is provided with arms *q*, pivoted to the standards *p*. At each end of the movable bar I is an adjusting-screw, *r*, whereby the lower surface of the bar may be set at any desired elevation with relation to the upper surfaces of the bars H, the bar I occupying a space intervening between the stationary bars. As a tension device only, the surfaces of these bars may be smooth, and the tension increased or lessened by the adjustment of the movable bar. As a spreading or smoothing device, the upper surfaces of the stationary bars and the lower surface of the movable bar are angularly corrugated or scored. It will be seen that from a point midway between its ends each bar is scored diagonally, and that the scores on one end of the bar incline upward and to the right-hand side of the machine from the lower edge of the bar, and vice versa on the other end, and also that each score has a sharp edge on the side thereof farthest from the center of the bar, so that, as in stretching-machines heretofore constructed, having similarly-scored surfaces, the cloth is smoothed by passing over and between the bars.

K denotes a delivery-roll, usually provided with a sanded surface, and called a "sand-roll," over which the fabric is conducted to the folding-knives. A similar roll has heretofore been employed. It is driven by a belt from the adjacent crank-wheel *b*. As heretofore constructed this roll could only be rotated by its belt, or by slipping thereunder. One portion of my invention relates to mounting this roll in such a manner that it can readily be rotated by pulling on the cloth, and also be capable of being driven by its belt after the cloth has been adjusted and the folding-knives in operation. This is accomplished by loosely mounting the sand-roll pulley *s* on the roll-shaft, and connecting it thereto by means of a ratchet and pawl, as at *t*, fully shown in Fig. 1.

When cloth is folded from a cloth-beam the journals of the beam occupy the bearings at *u*, on arms projecting from the rear of the machine. When folded from a simple roll, the cloth is put into the box L beneath the sand-roll. This box is mounted on the bottom of a table hinged to the machine, and, when in use, is held with its open side upward by hooks, as at *v*. When cloth is folded from irregularly flatly-folded pieces, the box-table is lowered, as indicated in dotted lines in Fig. 2, and the cloth laid upon the table.

In operation, the end of the fabric, when in rolls, is taken over the sand-roll, and drawn forward, (the roll freely revolving,) passed under the lower guide-rod G; thence between the bars H and I; thence over the upper rod G, downward between the folding-knives, and adjusted between the front end of the table and its holding-jaw, after which the machine is started.

When the fabric is delivered from a folded piece it may be passed directly under the lower guiding-rod, and not over the sand-roll.

It will be seen that each of the knives operates in conjunction with one of the jaws, and that they alternately control the fabric. The knife C operates in conjunction with the front jaw, and knife C′ with the rear jaw, beneath the tension device. At each jaw the inactive knife passes freely above and beyond the jaw, while the active knife passes below and between the jaw and the table, carrying with it the fold of the fabric, as indicated in dotted lines in Fig. 2. The means of adjustment are such that the lengths of the folds will be long or short, as desired, and, by applying any well-known registering apparatus, the length of each piece of cloth therein folded may be accurately determined.

It will be seen that the jaws cannot possibly injure the fabric, while having a capacity for securely holding it, and that the compression on the fabric at the folds increases in proportion to the increase in the number of folds laid between the table and the jaws.

I am aware that it is not new to hinge folding-knives to pendent arms, coupled together and arranged to vibrate simultaneously.

My folding-knives are much simpler and less expensive than those which are attached to a rocking and vibrating head-block, as heretofore, and, as I believe, are much more accurate and reliable in operation.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a cloth-folding machine, the combination, with suitable jaws, of a folding-table, centrally mounted, and rocking on a transverse shaft, which moves vertically with the table, and is supported by springs, substantially as described.

2. A table, centrally mounted, and rocking on a transverse shaft, which is supported by springs and suitable holding-jaws, in combination with a pair of parallel folding-knives, each of which is arranged to operate in conjunction with one end of the table and a holding-jaw, is rigidly mounted on a pair of pivoted standards, which are linked together, and simultaneously vibrated on their pivots, substantially as described.

3. The combination, with the folding mechanism, of stationary tension-bars and an intermediate adjustable bar, with or without diagonal spreading-scores, substantially as described.

4. The combination, with folding mechanism and a delivery-roll, of a belt-pulley, rotatively connected with the delivery-roll by a pawl and ratchet, substantially as described.

JESSE D. COTTRELL.

Witnesses:

PHILIP F. LARNER,

A. B. CAULDWELL.