(No Model.)

W. A. RICHARDSON.

CLOTH FOLDING MACHINE.

No. 456,851. Patented July 28, 1891.

FIG. 1.

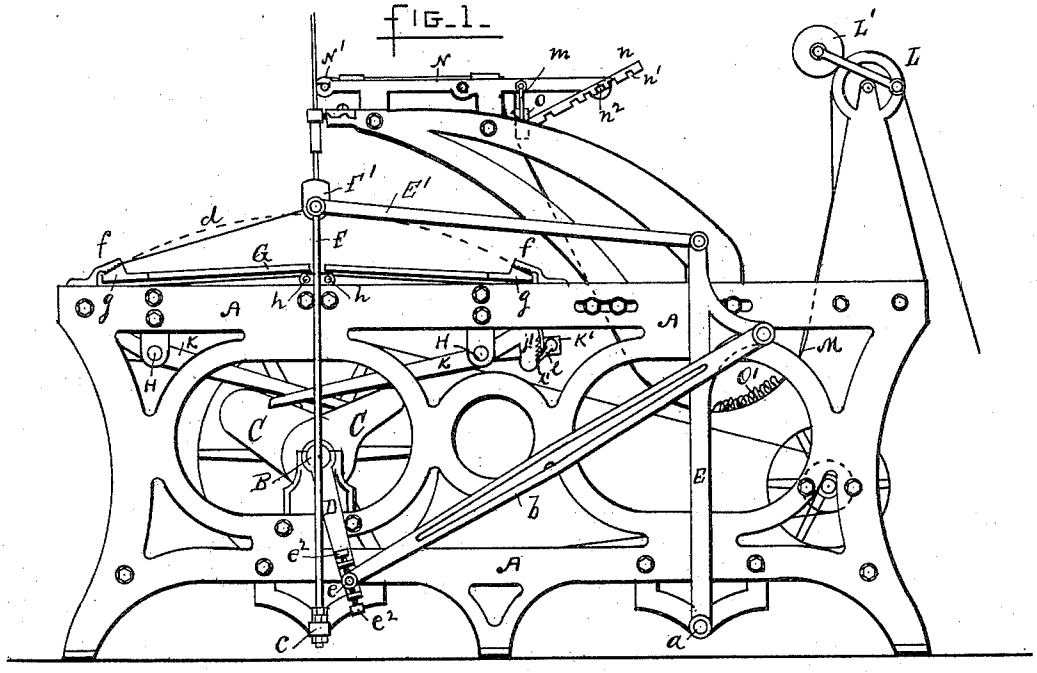
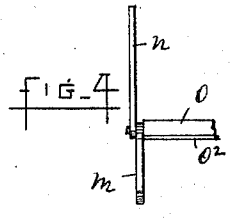


FIG. 4.



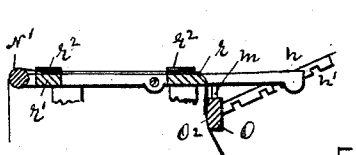
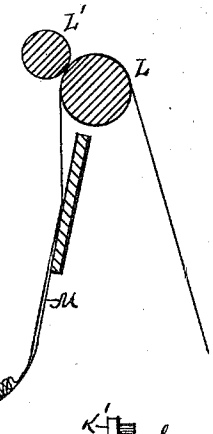


FIG. 2.



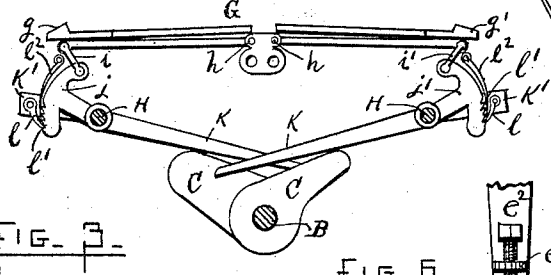


FIG. 3.

FIG. 6.

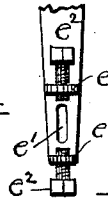
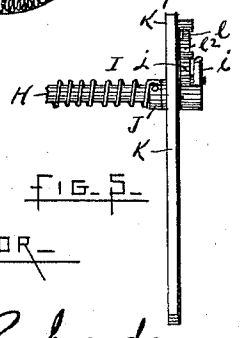


FIG. 5.



Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIE ADDISON RICHARDSON, OF WORCESTER, MASSACHUSETTS.

CLOTH-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 456,851, dated July 28, 1891.

Application filed September 27, 1886. Serial No. 214,670. (No model.)

To all whom it may concern:

Be it known that I, WILLIE ADDISON RICHARDSON, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Cloth-Folding Machines, of which the following is a specification containing a full, clear, and exact description of the nature of my invention and in what manner the same is to be performed, accompanied by drawings forming a part of my specification, and in which—

Figure 1 is a side view of a cloth-folding machine embodying my invention. Fig. 2 is a detached sectional view of the flexible apron and device for applying friction to the cloth to be folded with adjoining parts. Fig. 3 is a detached view of the mechanism for opening the jaws in order to receive the several folds of cloth. Fig. 4 shows a portion of the device for applying friction to the cloth. Fig. 5 represents a portion of the mechanism for opening the jaws, and Fig. 6 is an enlarged view of a portion of the crank-arm.

Similar letters refer to similar parts in the several views.

My invention relates to that class of cloth-folding machines in which the cloth is folded at regular spaces, making the several folds of a uniform and predetermined length. The mechanism directly concerned in the operation of folding is substantially the same as in the folding-machines now in use, my present invention relating more particularly to that part of the machine by which the cloth is fed to the folding mechanism and also to the construction and arrangement of the mechanism for actuating the folding mechanism, as hereinafter described, and specifically pointed out in the claims.

A A denotes the frame of the machine, and B a shaft placed transversely across the machine carrying the cams C C and crank D.

E is a vibrating arm pivoted at *a* and actuated by the crank D through the connecting-rod *b*. The vibratory motion of the arm E is conveyed by the connecting-rod E′ to the rod F pivoted at *c* and carrying at the upper end the folding-blade F′, which is moved in the arc indicated by the broken line *d* over the table G and alternately between the jaws *f g* and the jaws *f′ g′* in the usual and well-known manner and requiring no detailed description, allowing the successive folds to be carried between and securely held by the jaws while the folder is employed in forming the next succeeding fold. The motion of the folding-blade is varied in extent by moving the crank-pin *e* in the slot *e′* in the end of the crank-arm D and maintaining it at the required distance from the axis of rotation by means of the set-screws e^2 e^2, held in the lugs e^3 e^3 on the crank-arm.

The mechanism for actuating the folding-blade, consisting of the crank D, vibrating arm E, and their connecting-rods *b* and E′, are duplicated on the opposite side of the machine, (not shown in the drawings,) whereby the vibratory motion is imparted to both ends of the folding-blade, holding it parallel with the shaft B. The jaws *f* and *f′* are fixed, and the jaws *g* and *g′*, formed on the outer edges of the table G, are hinged at *h* and connected by links *i i′* with the sectors *j j′*, which are attached to the shafts H.

Upon each of the shafts H are placed spiral springs I, one of which is partially shown in Fig. 5. One end of each of these springs is attached to the rigid frame-work of the machine and the other end to the collar J, which is attached to the shaft H, so that the torsional force of the spring will serve to hold the hinged jaws against the fixed jaws in the usual and well-known manner of applying the force of a torsional spring. Turning upon the shafts H are levers whose long arms K rest upon and are raised by the cams C C, and their short arms K′ carry pawls *l*, which engage the teeth *l′* upon the sectors *j j′*, and their connected hinged jaws are brought down by the action of the cams C C as the levers K are raised, thereby opening the jaws at the proper time to allow the folding-blade to enter.

Attached to the frame of the machine are the curved bars l^2, with their free ends extending partially over the toothed surfaces of the sectors *j j′*, serving as shield-plates, upon which the pawls ride during the upper portion of their oscillating motion. As the pawls move downward off the shields l^2 they engage the first exposed tooth, carrying the sectors down and opening the cloth-holding jaws,

so that the blade may carry a fold of the cloth between them, and as successive folds of cloth are carried between the jaws they are held open and the sectors held at each fold farther down, exposing more of the toothed surface to be engaged by the pawls in their next downward motion. The cloth is conducted to the folding-blade through the rolls L L′ and over an apron M, table N, with side guides to determine the alignment of the cloth, and over a roll N′ to the folding-blade F′ in the manner common in machines of this class. It is, however, customary to employ an apron of wood or sheet metal and to secure the required friction on the cloth by means of a drag placed upon the cloth as it moves over the table N. In my present improved machine I use a flexible apron, and the required friction on the cloth is secured by a friction-bar O, pivoted by a link *m* to the frame and held against the cloth by a brace-bar *n*, having notches *n′* engaging a pin n^2 on the frame N. As it is required to increase the friction, the friction-bar is carried beneath the table, causing the cloth and flexible apron to form an acute angle with the table N.

In practice it is usual to feed the cloth into the apron in advance of the operation of folding, so that a quantity of cloth O′ will remain in the apron while the process of folding is going on. By using a flexible apron I am able to regulate the pressure exerted by the friction-bar on the cloth by varying the amount of cloth held on the apron, any increase of weight on the apron tending to draw the flexible apron in a straight line as it passes over the friction-bar O.

It has been customary in folding-machines now in use to actuate the folding-bar by a crank connected directly with the folding-bar, said crank being placed upon a shaft at the end of the machine. This construction requires a much larger amount of floor-space for the machine, as one-half of the sweep of the crank is outside of the frame. I render the machine more compact by placing the actuating-shaft B directly beneath the table and causing the cams C C to act immediately upon the levers K, which carry the actuating-pawls. The friction-bar O is pivoted in the links *m* and brace-bars *n*, so that the face O^2, which is preferably made curved, may rest equally against the cloth at whatever angle it may form with the table N, which in the machine shown in the drawings consists of the bars *r* *r′*, which extend across the machine from side to side and hold the side guides r^2.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a rigid bar over which the cloth passes, an adjustable friction-bar parallel with said rigid bar, means connected with said friction-bar, substantially as described, whereby said friction-bar is adjusted with reference to said rigid bar, and a flexible apron having a sagged portion containing a portion of the cloth to be folded and having one end attached to said rigid bar and having said adjustable bar resting against the apron to press it out of a straight line from the rigid bar to the sagged portion, so that the weight of the cloth on the apron will be applied to hold the apron against the adjustable friction-bar, substantially as described.

2. The combination of a rigid bar over which the cloth passes, an adjustable bar attached to the frame by a pivoted link, and a notched brace-rod engaging a pin on the frame by which the adjustable bar is held against the cloth, substantially as described.

3. The combination, with a stationary folding-bed provided with cloth-holding jaws, of a folding-blade having a vibratory movement over said bed, swinging rods F, vibrating levers E, links E′ and *b*, actuating-crank D, a shaft B, placed beneath the folding-bed, cams C C on said shaft B, actuating said cloth-holding jaws, and connecting mechanism between said cams and said cloth-holding jaws, substantially as described.

4. The combination, with a stationary folding-bed provided with cloth-holding jaws and a folding-blade having a vibratory movement over said bed, of the shaft B, placed beneath the bed, cams C C on the shaft B, pivoted levers having arms K K′ and carrying pawls *l*, toothed sectors *j j′*, shafts H H, carrying said sectors, springs applied to said shafts to raise said sectors and hold the jaws together, and hinged leaves forming a part of said cloth-holding jaws and connected by links with said toothed sectors, substantially as described.

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Witnesses:
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RUFUS B. FOWLER.