(No Model.) 2 Sheets—Sheet 1.

J. B. CLARK.

MACHINE FOR MULTIPLE FOLDING WIDE FABRICS.

No. 483,735. Patented Oct. 4, 1892.

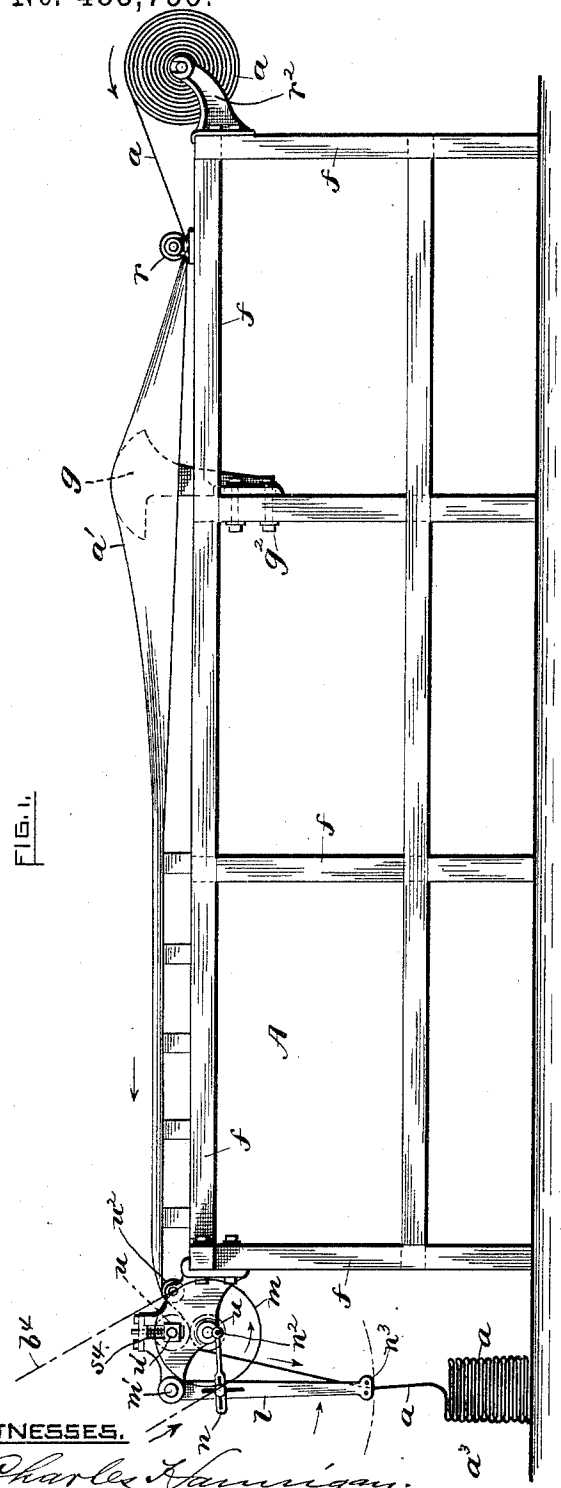

FIG. 1.

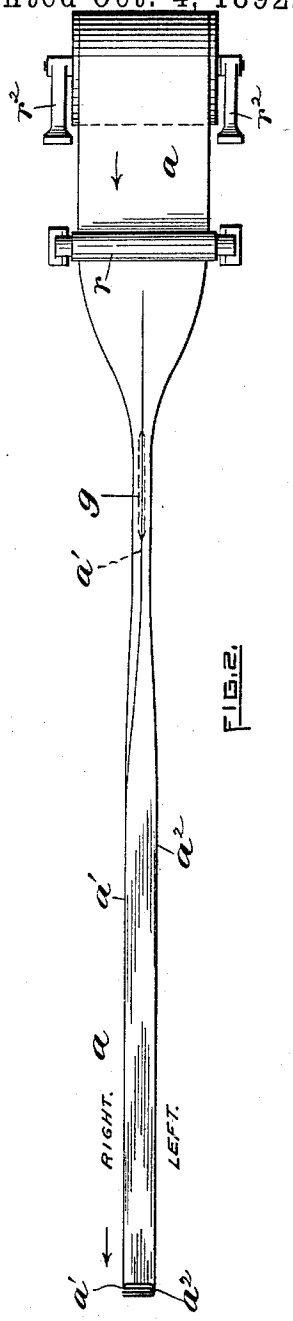

FIG. 2.

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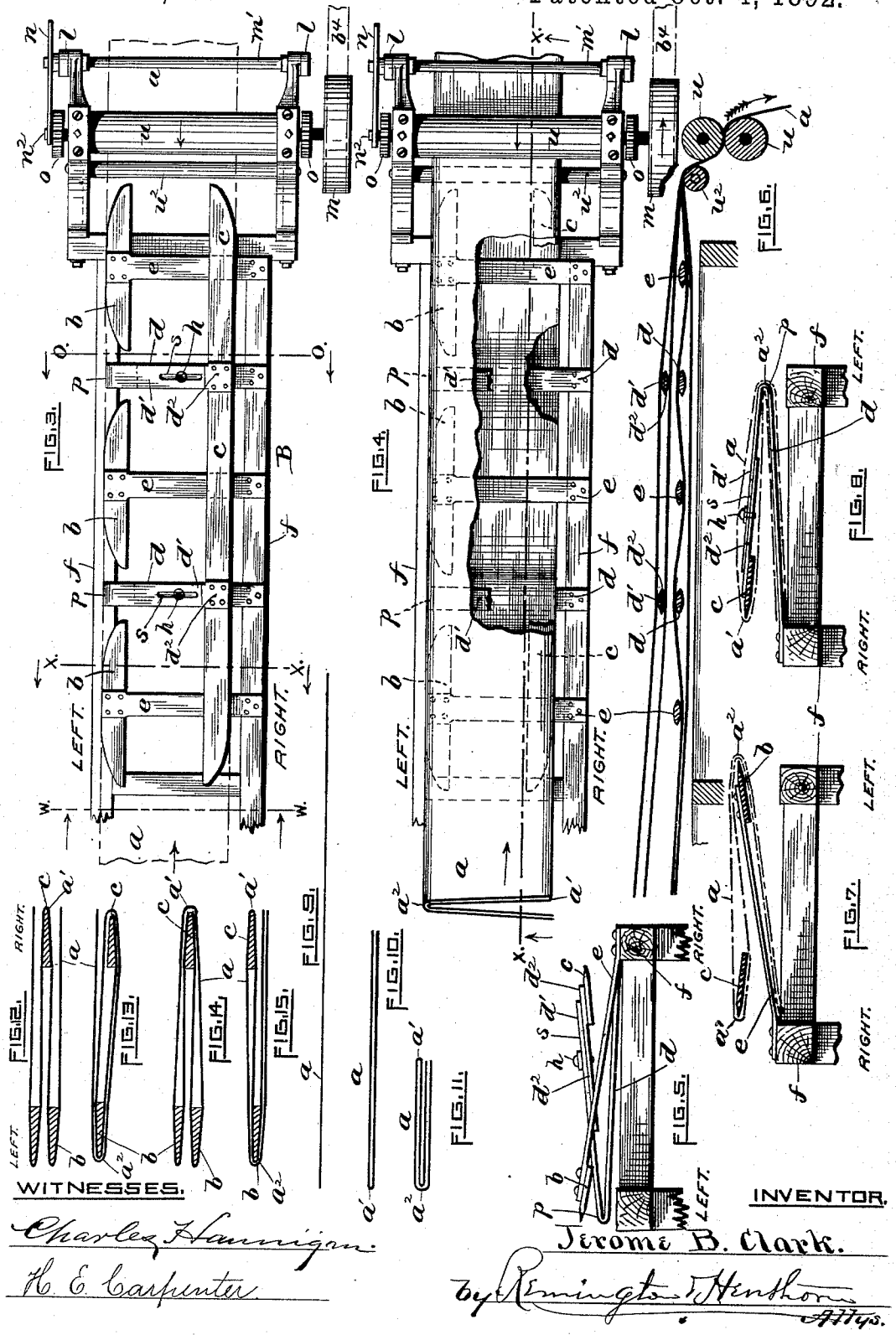

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UNITED STATES PATENT OFFICE.

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MACHINE FOR MULTIPLE-FOLDING WIDE FABRICS.

SPECIFICATION forming part of Letters Patent No. 483,735, dated October 4, 1892.

Application filed June 22, 1891. Serial No. 397,110. (No model.)

To all whom it may concern:

Be it known that I, JEROME B. CLARK, a citizen of the United States, residing at Allendale, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Machines for Multiple-Folding Wide Fabrics; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The improvement forming the subject of my invention relates to a novel machine for longitudinally folding webs of cotton cloth or other pliable fabrics having considerable width.

The object I have in view is to produce a machine so constructed and arranged that the cloth or fabric (in a single-ply state) in its passage through it will be continuously folded in a longitudinal direction, the form of the folded cloth as it leaves the machine being four-ply or twice folded.

The machine may be provided with a supplemental folder arranged to fold the cloth transversely preparatory to book-folding and pressing the cloth for the market.

To that end my invention consists, essentially, of an initial guide or folder-plate arranged to engage and fold the cloth, a series of oppositely-mounted secondary folder-plates arranged to receive the once-folded or two-ply fabric and refold the latter into a four-ply or twice-folded form while it is traveling along and in contact with the said folder-plates, and mechanism for drawing the thus-folded cloth through the machine.

By means of my improvement the mounted rolled web of wide cloth is as it unrolls first folded centrally in a longitudinal direction by the use of the initial guide or plate. The thus once-folded or two-ply traveling cloth is next deflected or diverted so as to engage a series of adjustable horizontally-arranged oppositely-mounted stationary guides or plates, which act to crease and again fold or produce a twice-folded cloth, an attendant at the same time keeping the two selvages of the running cloth true and parallel; or, in other words, the series of guides last named are secured to the free ends of fixed arms, and are separated from each other laterally or transversely of the machine. When thus arranged the guides—say at the left side of the machine—engage with and form a center crease along the inner surface or center of inside fold of the twice-folded cloth, while at the same time the opposite or right guides are inclosed between the folds and engage the crease formed by the first or initial guide-plate. The said right guides are secured to bent or reflexed arms, the latter having the elbow portions substantially in line with the outer edges or faces of the left guides, the cloth at the same time having its inner fold traveling within the inner angle or hollow of the elbow, while the outer fold of the cloth is bent around and in contact with the exterior of the elbow portion of the arms—that is to say, the right-hand guides and their supporting-arms are practically inclosed between and concealed within the upper and lower or inner and outer folds of the traveling web of cloth, all as will be more fully hereinafter set forth and claimed.

In the appended two sheets of drawings, Figure 1, Sheet 1, represents a side elevation of a cloth-folding machine embodying my improvements. Fig. 2 is a plan view, portions of the mechanism being omitted. Fig. 3, Sheet 2, is an enlarged plan view of the delivery-end portion of the machine, the cloth being removed. Fig. 4 is a similar plan view, the fabric being in position as in use, a portion of it, however, being broken away. Fig. 5 is a transverse sectional view, enlarged, taken on line *w w* of Fig. 3. Fig. 6 is a longitudinal sectional view taken on line *x x* of Fig. 4. Fig. 7 is a cross-sectional view, enlarged, taken on line *x x* of Fig. 3. Fig. 8 is a similar sectional view taken on line *o o* of Fig. 3. Fig. 9 indicates the width of the cloth or fabric before being folded or in a single-ply state. Fig. 10 represents the cloth once folded or two-ply. Fig. 11 is the same when again doubled or twice folded the cloth thus folded having a four-ply thickness; and Figs. 12, 13, 14 and 15 are similar transverse sectional views showing the fabric folded in a four-ply form in different ways and also

showing the relations of the secondary folder-plates thereto.

In carrying out my invention the several folder-plates or cloth-guides of the machine A are mounted on a suitable framework *f* of wood or other material. The form and arrangement of the parts composing said frame may be varied or modified as desired.

To the cloth-entering end of the machine is secured a pair of upturned brackets r^2, arranged to receive the center or arbor, on which is wound the piece or web of fabric *a*. The cloth or textile fabric referred to may be made of cotton, wool, linen, silk, or other fibrous material. My invention is, however, more particularly adapted to be employed for folding goods having considerable width—as, for example, sheetings and other six-quarters to twelve-quarters wide or even wider fabrics.

The driving and feeding mechanisms are located at the delivery end of the machine. The same consists simply of a pair of oppositely-revolving rolls *u*, between which the folded fabric is drawn, thereby at the same time pressing the cloth to a certain extent. To the shaft of one of the rolls—say the lower one—is secured a pulley *m*, power being communicated to it by a belt b^4, leading from any suitably-driven pulley. The rolls revolve in unison by means of gears *o*, secured to the roll-shafts. The upper roll-shaft is mounted in movable boxes *u'*, Fig. 1, backed by an adjustably-mounted spring s^4, thereby affording means whereby the attendant may readily regulate or control the pressure upon the traveling fabric.

In some cases it is desirable that the twice-folded or four-ply fabric be intermittingly cross-folded as it leaves the rolls *u*. In order to effect this, I provide the machine with a supplemental folder, substantially the same as commonly used on cloth drying and finishing machines—that is to say, a pair of downwardly-extending arms *l*, secured to a mounted shaft *m'*, are vibrated back and forth intermittingly by a link or connection *n*, jointed to one of the arms and to a crank-pin n^2, mounted in one of the gears of the lower roll. (See Figs. 1 and 3.) The lower end of the arms or levers are connected by tie-rods or guides n^3, separated from each other, between which the cloth freely passes, the action of the device being to pile up the cloth in a zig-zag manner in continuous layers, as at a^3, Fig. 1. From the foregoing it is apparent that the cloth is continuously unrolled and drawn through the rolls *u* at any practical rate of speed corresponding to the speed of the driving-belt. The web of cloth *a* as it unrolls from the arbor is centrally and continuously creased and folded longitudinally by means of a normally-stationary initial guide or folder plate *g*, Fig. 1, extending, as drawn, above the top and longitudinally of the frame *f*. The working face or edge of the guide *g* is well rounded lengthwise and quite thin transversely. It may be made of hard wood or metal. The guide may be adjusted vertically by loosening the holding-down bolts g^2, which also pass through slotted holes formed in the guide-base. A horizontally-mounted guide-roll *r* is located intermediate of the guide *g* and the roll of cloth for the purpose of effecting a better engagement of the cloth with the folder-plate. The cloth as it leaves the latter is once folded or two-ply, its upper or double edge forming a central crease or seam *a'*. (See also Fig. 10.) The thus once-folded cloth is next deflected at substantially right angles or horizontally to its former position and introduced to a series of secondary folder plates or guides *b c*, soon to be described. (See Sheet 2 of the drawings.) These plates, it will be seen, are arranged longitudinally of the machine and on either side thereof, the same being fixed to the outer or free ends of arms secured to the frame. The ends of these guides are well rounded, so as to readily enter the folds of the cloth. The guides may be made of hard wood or other suitable material and finished substantially like the guide *g*, before described.

By referring to Fig. 3 it will be seen that, as therein drawn, there are at the left side of the machine three short guides *b*, each being secured to a somewhat upwardly-bent metallic arm *e*, the latter in turn being secured to the right side of the frame *f*.

The machine is further provided at the right with a long guide-plate *c*, the same being located opposite to but substantially in the same plane with the shorter guides *b*. The guide *c* is secured to short arms d^2, the latter being adjustably secured to reversely bent or reflexed arms *d*, alternating with the arms *e* and fastened to the same side of the frame. The upper or free end portion *d'* of the arms *d* are provided each with slots, through which suitable screws or bolts *h* pass. By this latter arrangement the guide *c* may be readily adjusted transversely of the machine, so as to bring it nearer to or farther from the other guides *b*, such adjustment being necessary or convenient in order to effect a proper relation of the width of the several folds of the various cloths. The elbows *p*, formed at the point where the arms *d* are bent or reflexed, are adapted to serve as a guide for the traveling cloth. I would state here that in lieu of making the guide *c* in one long piece, as drawn, it may consist of two or more shorter ones, substantially like its fellow guides *b* at the opposite side of the frame, each then being mounted on an adjustable arm, as just described.

It will be seen that the series of secondary or lateral guides *b c* are located between the initial guide *g* and the feed-rolls *u*, the initial and secondary guides being longitudinally separated from each other a sufficient distance to readily permit the folded cloth to be gradually turned or deflected about ninety degrees before it engages the folders or guides

b c. The front ends of the latter I place sufficiently near to the feed-rolls (see Fig. 3) to thereby insure that the folded cloth enters the rolls properly.

The manner of continuously folding fabrics according to my improvement is substantially as follows: The roll of cloth is first suitably mounted. The free end of the piece or web is next carried forward by the attendant to engage a suitable guide or folder arranged to crease and fold it once longitudinally. The thus once-folded or two-ply cloth is then, as represented in the drawings, turned over at substantially-right angles, thus at the same time approximately refolding it, and the thus twice-folded or four-ply end introduced by the attendant to engage the right and left guides *c b*, which have been previously adjusted or separated, so as to transversely divide the cloth evenly—say into four divisions. The cloth is now drawn along in close contact with the outer edges of the guides and passed between the revolving feed-rolls *u*, which latter also act to simultaneously press the fabric, one of the rolls being made adjustable in order to regulate the pressure as desired. The driven rolls now draw the fabric through the machine and deposit it upon the floor or a table beneath, or it may be conducted therefrom in any proper direction. Practically, however, I provide the machine with a pair of suitably-operated vibrating folder-arms *l*, arranged to receive the cloth and deliver it folded in a zigzag manner, as at a^3, Fig. 1.

I would state that the inner adjacent sides of the middle or centrally-creased portion *a'* of the two-ply or once-folded cloth bear against and inclose the right secondary guide *c*, the left or opposite guides *b* at the same time again subdividing or twice folding the cloth, thereby forming a corresponding crease a^2, the inner folds of the cloth bearing snugly against the last-named guides. (See Fig. 7.) When the thus-mounted fabric arrives at the bent arms *d*, supporting the adjustably-retained guide *c*, it will be seen, referring to Fig. 8, that the reflexed arms and their guide lie wholly within and are practically concealed by the upper and lower or inner and outer sides of the cloth, the bend or elbow *p* also serving as a guide at the point or line a^2, where the cloth is refolded, the guide *b* then lying between the two thicknesses of cloth above and the two below, as before stated. (See Fig. 7.)

When the machine is in operation, the attendant is stationed at the right at the point B, Fig. 3, his duty being to so pull or draw the two selvages of the cloth as to keep them true and parallel and sufficiently in line with each other and at the same time keep the fabric free from wrinkles and in proper contact with the outer edges of the left and right guides *b c*.

By means of my improvement it will be seen that the outer edge of the adjustable guide *c* bears against the middle line *a'* of the cloth traveling above and beneath the guide and its bent arm in such manner that the inner fold or half of the cloth lies within the angle of the elbow *p*, while the outer fold lies over or outside of it. The other guide *b* is separated from *c* about one-fourth of the width of the cloth, the width of the fold being controlled by said distance. This guide *b* bears against the twice-doubled cloth and determines the line of the second bend or fold a^2, so as to make the cloth four ply or twice folded.

Goods folded accorded to my improvement present a smooth, neat, and regular appearance, the several folds being uniform and true.

In Figs. 12, 13, 14, and 15 I have represented various forms of a wide fabric folded so as to make a four-ply thickness. The said figures also indicate the position or relation of the laterally-separated secondary guides *b c* to the folds. I would state, however, that I consider the arrangement shown in Figs 12 and 15 as being the most practical, the last-named being substantially the same as shown in Figs. 4, 7, 8, and 11. In Fig. 12 there are two series of left guides *b*, one being above the other. In all cases I prefer that the two selvages of the cloth after being doubled or folded lie on the same side of the machine, the same, as drawn, being the right side.

Although the several arms are represented in the drawings as being substantially rectangular cross-sectionally, it is obvious that arms of any suitable shape may be used. The first or initial guide may be placed horizontally instead of vertically, the once-folded cloth next passing therefrom to the secondary plates to be again folded.

The precise construction and arrangement of the parts represented may be departed from or modified by the use of substantial equivalents without departing from the essential features of the invention.

I do not claim, broadly, a folding-machine arranged to automatically and continuously fold webs of fabrics or other flexible material; but

What I do claim as my invention is—

1. The combination of an initial guide or folder with oppositely-arranged secondary guides *b c* and fixed arms having said secondary guides secured to the free ends thereof, substantially as described.

2. The combination, with a device for initially or first folding a web of fabric longitudinally, of oppositely-located secondary folder-guides *b c*, arranged parallel with each other and lengthwise of the web, and arms or supports carrying said secondary guides, fixed to one side of the machine, and suitably mounted and actuated rolls for drawing the fabric through the machine, substantially as hereinbefore described, and for the purpose set forth.

3. In a cloth-folding machine, the combination of one or more guides *b*, an oppositely-located guide or guides *c*, and bent or re-

flexed arms having said guides *c* adjustably secured thereto, said guides and arms being arranged to receive a web of folded cloth endwise and refold it, substantially as described.

4. In a cloth-folding machine, a series of oppositely-arranged stationary folder-guides having their outer edges adapted to engage the folds of the traveling fabric, and arms having said guides secured thereto, said arms being attached to one side of the machine, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

JEROME B. CLARK.

Witnesses:
CHARLES HANNIGAN,
GEORGE W. GOULD.