

H. W. & A. W. BREWTHALL.
CLOTH FOLDING FRAME.

No. 460,237.

Patented Sept. 29, 1891.

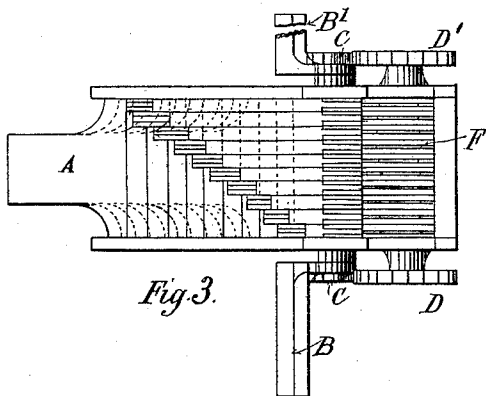


Fig. 3.

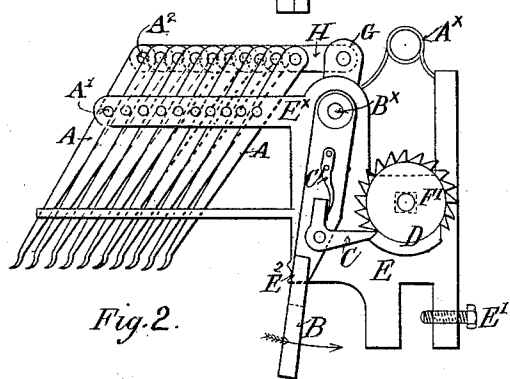


Fig. 2.

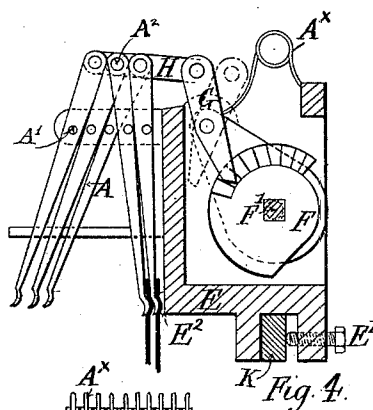


Fig. 4.

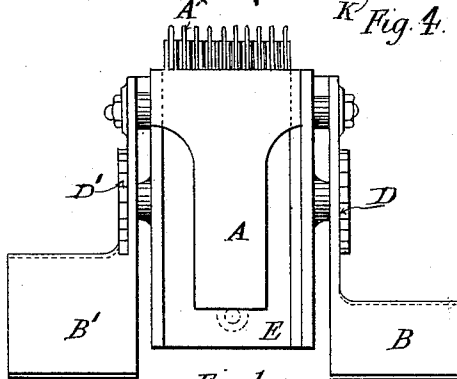


Fig. 1.

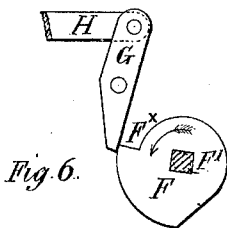


Fig. 6.

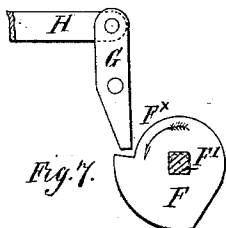


Fig. 7.

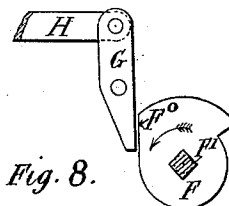


Fig. 8.

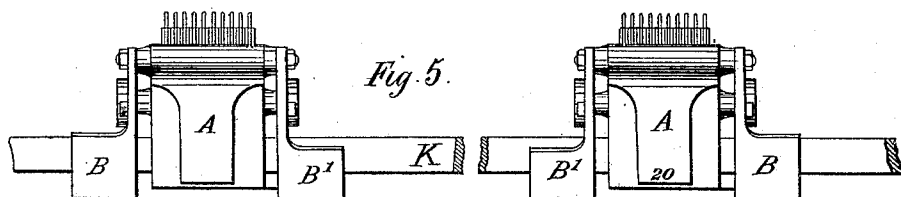


Fig. 5.

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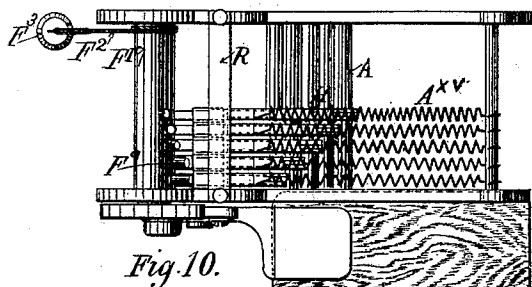


Fig. 10.

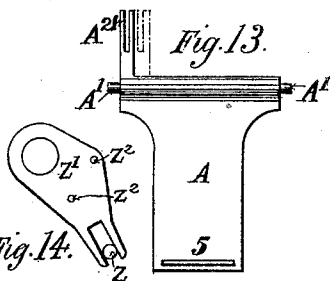


Fig. 13.

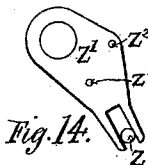


Fig. 14.

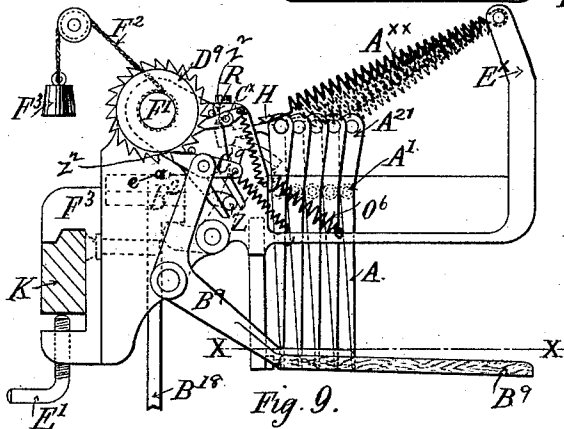


Fig. 9.

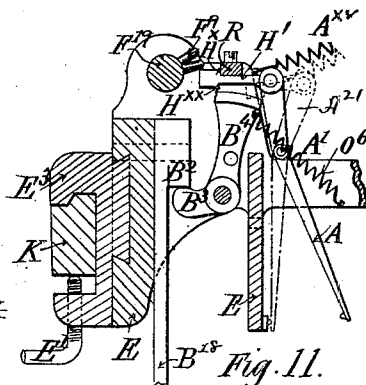


Fig. 11.

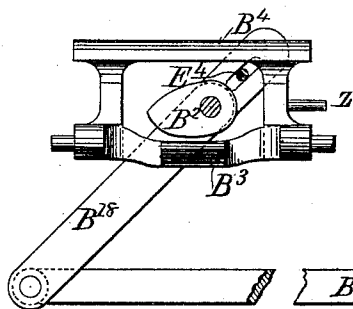
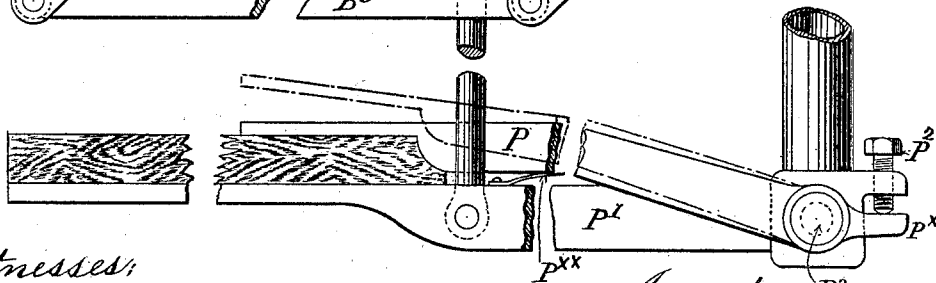
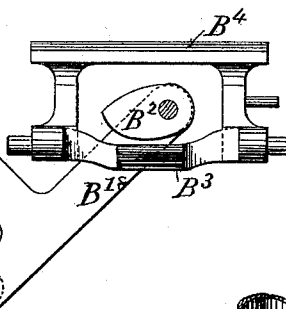


Fig. 12.



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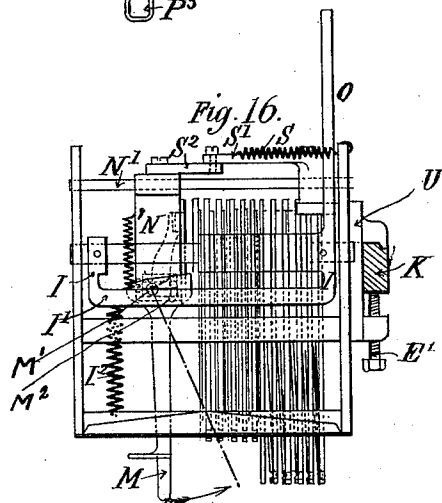
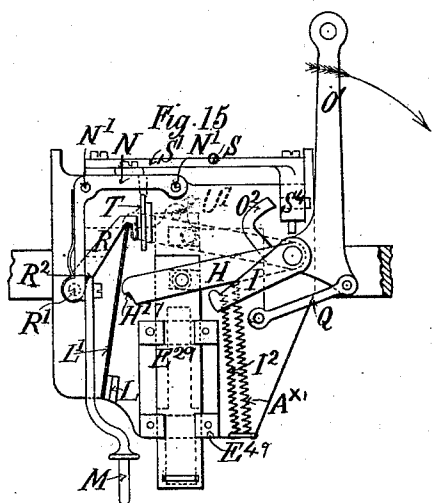
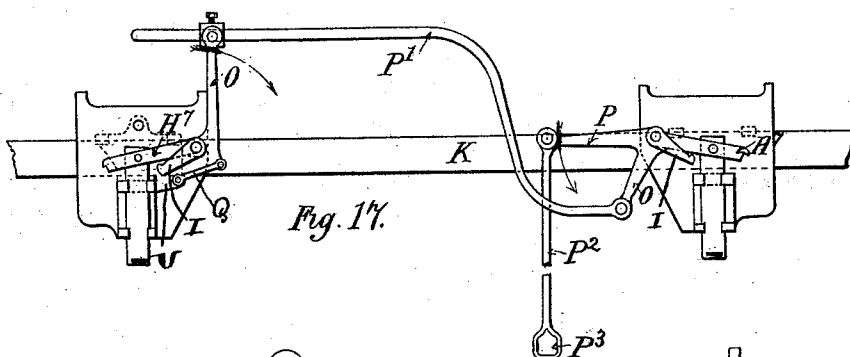


Fig. 18. Fig. 19.

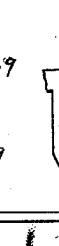
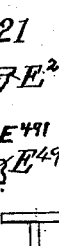
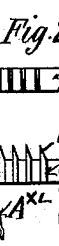
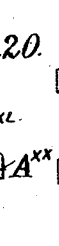
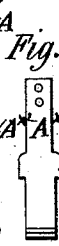
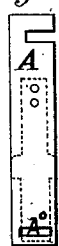


Fig. 23.

Fig. 22.

Fig. 26. Inventors:-

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UNITED STATES PATENT OFFICE.

HERMANN WILLIAM BREWTNALL AND ARTHUR WILFRED BREWTNALL, OF
DIDSBURY, MANCHESTER, ENGLAND.

CLOTH-FOLDING FRAME.

SPECIFICATION forming part of Letters Patent No. 460,237, dated September 29, 1891.

Application filed November 7, 1890. Serial No. 370,623. (No model.) Patented in England October 15, 1886, No. 13,136, and
May 25, 1887, No. 7,528.

To all whom it may concern:

Be it known that we, HERMANN WILLIAM BREWTNALL and ARTHUR WILFRED BREWTNALL, subjects of the Queen of Great Britain, residing at Didsbury, Manchester, in England, have invented certain new and useful Improvements in Cloth-Folding Frames, (for which we have obtained two patents in Great Britain, Nos. 13,136 and 7,528, dated, respectively, October 15, 1886, and May 25, 1887,) of which the following is a specification, reference being had to the accompanying drawings.

Our invention consists of an apparatus for enabling cloth to be "hooked" or folded without perforating its margin, as heretofore the practice. This object is effected by two similar apparatus—one left-handed and one right-handed—mounted upon one common bar at a distance apart equal to the width of the fold and each apparatus having the same number of mechanical clip devices for taking hold of each fold of the cloth as it is made, the said devices at the same time acting as end gages to insure the folds all being of equal length. Each fold is at each end caught and held by one of the clip devices, which only takes hold when caused to do so by the hand of the operator, which raises the cloth into position. When the whole "piece" of cloth has been folded and it has to be removed from the holders, all the clips in each of the two apparatus are made to release their separate folds and are made to resume their original position in readiness for the next operation, the clips being opened or "cocked" again into starting position.

Figure 1 of the accompanying drawings is a front view of one form of the apparatus; Fig. 2, an end view; Fig. 3, a plan, and Fig. 4 a vertical cross-section. Fig. 5 is a front view showing two such apparatus fixed on the bar of a hooking-frame, and Figs. 6, 7, and 8 are end views showing a clip-cam in three different positions. Fig. 9 is an end view, Fig. 10 a plan view, and Fig. 11 a vertical cross-section, of a modified form of apparatus. Fig. 12 shows the connections between two such apparatus, both mounted on the same hooking-frame bar. Fig. 13 is a detail view of a clip. Fig. 14 is a detail view of pawl-release

ing gear. Fig. 15 is a front view of another form of apparatus, and Fig. 16 an end view. Fig. 17 is a front view showing two apparatus combined for working, but with detail parts omitted for clearness' sake. Fig. 18 is a face view of a clip; Fig. 19, an end view of two such; Fig. 20, a face view of a clip-spring, and Fig. 21 an end view of two clips in different positions. Figs. 22 and 23 are enlarged front or end and side views, respectively, of the upper end of a spring-prong and part of a trigger-catch and of a catch-plate. Fig. 24 is a face view of part of the spring-prongs. Fig. 25 is a plan of a guide for the clip-lever, and Fig. 26 a plan of the trigger-block and parts connected therewith.

Referring to Figs. 1 to 8, the apparatus is in Fig. 2 shown with the clips A in the starting position. The clips are lever-shaped flaps, free to turn on pins A' in an arm E^x at each end of the framing or bracket E and have their lower ends each made with a projection or bulged part for nipping the fold of cloth. Their upper ends are at A² jointed to links H, which are also jointed each to a tumbler-lever G. The lower ends of the latter are acted upon by cams F on a square spindle F'. These cams are separate or cast in one piece. The cam-spindle F' is rotated by pawl-wheel D and pawl or catch C, which is mounted on a trigger-lever B. This latter is in Fig. 2 shown with the pawl or catch C on the first tooth of the ratchet-wheel D. The tripping-lever B is at B^x pivoted on the bracket E, and it will be understood that there is one such bracket left-handed and another such bracket right-handed and both mounted on the same bar K, Fig. 5. Each of the two brackets E is by means of a screw E' fixed to this bar K, which forms part of the ordinary hooking-frame, each bracket supporting a number of clips A, the number to be varied according to the length or lengths of material to be folded. Each clip A is acted upon by a cam F against the pressure of a spring A^x and so arranged as to close against the preceding clip at the will of the operator. The first clip closes against a suitably-formed stop or projection E² on the frame E. The clips A are caused to close alternately, one on

each bracket E, by the operator when he has raised the cloth into position for being caught and held. The progressive position of the clips is determined by the progressive or step-by-step position of the cams F on the axle F'. The raised part of the cams become step by step shorter, circumferentially, and so that when they are all in the position, Fig. 8, answering to the clips being open, the left sides F^o of the raised part of the cams will all be flush with each other. Each clip has its own cam, by which it is operated through the medium of a tumbler G and a connecting-link H. The large part of the cam F holds the clip open (see Fig. 6) until it is turned around into the position shown in Fig. 7, which allows the point of the tumbler G, bearing upon it, to drop into the recessed or smaller part F^x of the circumference of the cam, by which movement the tumbler G permits its clip A, forced by the spring A^x, to close. The ratchet-wheel D has the same number of teeth as there are clips A and cams F in the bracket E, which number varies for different kinds or lengths of material. The operator, after lifting the cloth into position—that is to say, so that one end of the piece comes up against one of the two brackets E against the projection E²—pushes the tripping-lever B in the direction of the arrow, and thus causes the pawl C to move the ratchet-wheel D around one tooth, and thereby, also, the cam-shaft F', on which the pawl-wheel is fixed, the corresponding cam on the said shaft releasing its tumbler G and permitting the clip A in question to close upon and take hold of one end of the piece or fold just lifted. He then carries the cloth across and lifts it up to the opposite bracket E and moves the lever B on that other bracket, as before, to cause a clip A on that bracket to take hold. He then clips a fold at the first bracket, and so on backward and forward. When the whole piece is folded, the inner levers B' in both brackets are brought into play to release the cloth. These levers act each upon the second ratchet-wheel—viz., D'—which for expediting the return motion has only two teeth for moving the shaft F' and two other teeth for preventing recoil. By means of this lever B' the cam-shaft F' is rotated from the position Fig. 7 to the position Fig. 8. In order to remove the cloth a further stroke of the levers B' moves the cam-shaft F' still farther around to such a position that the tumblers G ride on the sloping parts F^o and then on the large part of the cams, which movement allows the springs A^x to relieve all the clips A, so as to release the cloth therefrom, and opens the clips to their greatest extent, cocking them ready for beginning a fresh piece.

The releasing and cocking movements are brought about either by hand or foot. In the latter case treadle-rods would be connected to the levers B' and to a common treadle-board.

We will refer next to Figs. 9 to 14, which illustrate another form of apparatus. The

clips A are flat and lever-shaped, as in the previous example, are pivoted in front of one another at A', and are caused to close by springs A^{xv}. Only five of the clips are shown for simplicity's sake; but the bracket E is made to hold ten or any other suitable number, according to the number of folds that the piece of cloth is to be folded up in. For controlling their action the clips A have each an upper projection A²¹, to which is hinged (or against which abuts) a link H', having a notch H^x for engaging with a catch-plate R for holding the clips in an open position. In lieu of the connecting-links H' and tumblers G of the apparatus, Figs. 1 to 8, we in this form do away with the tumblers G and joint the links H', as stated, to the upper projections A²¹ of the clips A in such manner that they act as catches or engage with the catch-plate R when in the open position. The links H' are freed from the catch-plate R one by one, as required. One way of effecting this is by means of a rotating shaft F¹⁹, provided with studs F⁹, arranged thereon in a helical line, (or a rotating shaft with a helical rib will answer the same purpose.) This shaft F¹⁹ is caused to rotate part of a turn sufficient to free one link H' at a time from the catch-plate R by the movement of a trigger B⁹, carrying pawl C⁹, engaging with ratchet-wheel D⁹, as the cloth by the hand of the operator is lifted into position. To raise or cock the clips to the wide-open position for starting on a new piece of cloth, we employ a cocking-lever B¹⁸, the upper end of which is provided with a cam B². This latter engages with one arm B³ of a bell-crank lever, the other arm B⁴ of which engages with notches H^{xx} in the lower edges of the levers H when the shorter lateral arm B³ of the cocking-lever is forced down by the cam B² on the lever B¹⁸. The levers B¹⁸ on the two apparatus are connected by a rod B⁵, and both are actuated by an arm B⁶, integral with the cocking-lever B', treadle-rod B', and two treadles P P', the treadle P having a stop P^x and the treadle P' a set-screw P² and both working on the same pivot P³. When pressure is applied to the upper pedal P against the spring P^{xx}, a gradual motion is given to the said pedal until its back projection P^x reaches the adjustable stop P², whereupon the operator can remove the cloth which is released at this point. When the cloth has been removed, the operator can give the further downward movement of the pedal P', rod B', and levers B¹⁸, by keeping the foot on P' only, which is necessary to cock the clips and leave the machine ready for a fresh piece. The cams B² thus cock the clips A. The lever B⁴ during this operation moves from front to rear and carries the links H with it until they engage by their top notches H^x with the catch-plate R, being pulled upward by the inclined springs A^{xv}, attached to them and attached to a fixed part E^x of the frame E. At this point the bell-crank lever B⁴ is clear of the links H and free to return to its forward position,

owing to the influence of the spring O^6 , when the pressure is taken off the cam-lever P' . This cocking action may be accomplished in one or more movements, either by hand or foot. Thus the first part of the treadle motion would open the clips sufficiently to allow the cloth coming away freely, and the latter portion of the motion would open the clips to their full or cocked position, ready for a new operation. During the releasing of the cloth or cocking of the clips the tripping-shaft F^{19} is at any moment caused to return to its first position by a weight and cord $F^2 F^3$, (or by a spring,) in order that when the clips are opened the folding operation may begin again with the first clip. In order that the shaft F^{19} may fly back at the right moment, the pawls C^9 and check-pawl C^x , engaging the ratchet-wheel D , are lifted off by means of a pin Z on the arm B^4 of the bell-crank lever, which pin engages with a slot in a plate Z' , which plate is pivoted loosely on the spindle F^{19} , and, being caused to rock on the same by the cocking movement of the bell-crank levers $B^3 B^4$, the pins $Z^2 Z^2$ on plate Z' will press on the pawls $C^9 C^x$ and disengage them from the ratchet-wheel D . The part Z' is shown separately in Fig. 14.

The clips A are made to close one by one as the folds are brought into position by the hand of the operator by means of the trigger-lever B^9 , placed along the outside edges of the clips. The lever B^9 is raised by the hand in bringing up the cloth, and each such raising turns the ratchet-wheel D on the end of the tripping-shaft F^{19} one tooth. This lever finishes its stroke when its lower side reaches the horizontal position shown in dotted line xx , Fig. 9, and comes against a stop-peg e on the frame E and so acts as the top gage for the folds. In order that the cloth may come away freely from the clips when being removed, it is necessary that the distance between the outside edges of the clips of the two brackets be reduced, so as to relieve the tension of the folds. To accomplish this one bracket E , the left-hand one, is made with a dovetail groove to slide along a dovetail part upon the portion E^3 , which clamps the bar K of the folding-frame, so that it may move toward the other bracket E (or both brackets may be made to slide toward each other) at the moment of releasing. For this purpose the lever B^{18} is formed with a slot, in which engages a peg E^4 , Fig. 12. This latter is fixed in the fixed clamping part E^3 , and thus forms a fulcrum or abutment for sliding the bracket E relatively to the clamping part E^3 , as required.

We will refer now to Figs. 15 to 26. In the form of apparatus represented in these figures the clips have the springs applied to the blade part of the same and slide up and down against each other, (instead of swinging on pivots, as in the previous two forms,) and the two apparatus mounted on a common bar are so connected that all the spring-clips on both

can be simultaneously raised or put into the open or cocked position, while each apparatus is provided with a trigger for lowering the clips one by one, as required, into the nipping position. Each clip A is formed with a slot A^0 at its lower end and has affixed to its rear side a flat spring A^{XL} , which at its lower end is formed with a rear corrugation adapted to enter the slot A^0 in the clip A to the rear of it when forced to do so, thereby nipping and holding the cloth securely, but without in any way injuring it. Each spring A^{XL} has a tendency to close against its own clip-blade A , and thus when two or more clips are lifted up together from the bottom the corrugated portions of the springs A^{XL} come of their own accord out of the slots A^0 and so release the folds of the cloth. The clips work in guides E^{29} and E^{49} on the frame E of the apparatus, two such being mounted on the common hooking-frame bar K . The guides E^{49} , Fig. 21, are formed with slanting projections $E^{49'}$, which take against side lugs A^{xx} on the springs A^{XL} , thus when the clips descend causing each spring to spread away from the clip A , to which it is fixed, and to press against the next clip-blade A to the rear of it. The back or first clip-blade A has no spring fixed to it. The clips are numbered conspicuously consecutively, so that by noting the number on the last clip used the correct number of folds formed can be ascertained at a glance without counting. The clips $A A^{XL}$ are actuated by means of levers H^7 , jointed thereto and capable of being raised into the starting position by means of the two levers I , which latter have a cross connection or bar I' , which runs from back to front underneath the clip-levers H^7 . I^2 is a spring for pulling the frame $I I'$ down. T , Fig. 15, (shown separately in Fig. 25,) is a plate having grooves for guiding the clip-levers H^7 when in the top position. At the end of the up or cocking stroke a series of spring prongs or reeds L' on a catch-plate L , Fig. 15, (shown separately in Fig. 24,) fall into notches H^{17} in the ends of the clip-levers H^7 , thus retaining them in the raised position shown in dotted lines in Fig. 15 until they are required to drop. A^{x1} are retracting-springs connected to levers H^7 . They are made to drop one by one by means of a trigger M , which depends on the outer side of the bracket E from a trigger-block N , which is guided on two horizontal rods N' . A slot M^2 in the head of the trigger and a fixed stud M' , over which it works, limit the stroke of the trigger. When the trigger M is pushed by the hand of the operator in the direction of the arrow, Fig. 16, in putting up a fold of cloth to be secured, it turns the trigger-catch R , which is pivoted at R' in a plane at right angles to the trigger-pivot M' , and has a notch at R^2 for the upper edge of the trigger M to bear upon and thus to turn it in the direction of the arrow in Fig. 22; thus by its hooked upper end carrying with it the prong L' from under the notch H^x of the clip-lever, H^7 be-

longing to the clip which it is desired to use. As the hand of the operator comes away after securing a fold of cloth the trigger M moves forward under the influence of a spring S, connected to the lever S', which is connected to the trigger-block N by a link S², until it is in the same relative position with regard to the next clip to be used as it was to the preceding one before it came into play. It is stopped at the right position by the catch R, which by the spring S has been moved forward so as to come in contact with the next clip-lever H⁷. This operation is repeated for the required number of folds of any length of cloth, and then a cocking-lever O and O' (which, as shown in Figs. 16 and 17, are in one piece with the lever-frame I I' on each apparatus) is by the lever P, connecting rod P' and rod P² with stirrup P³, acting simultaneously on the two brackets E, brought into play to release the cloth and put the clips into the upper or cocked position. When releasing and cocking, the trigger M is moved back to the first clip by an arm or horn O², projecting from the cocking-lever O or O'. The horn O² in the cocking operation presses against a short arm S⁴ on the boss of the lever S', and through it and the link S² forces the trigger-block N along its guides N' till it gets home to the first clip. The lever S', and thereby also the block N, is pulled forward in the direction of the arrow in Fig. 26 by the spring S. The trigger-block N gets home before the clips A A^x finish rising, so that it has a clear passage. The right-hand bracket is kept fixed in position; but the left-hand bracket has a plate U, which is fixed to the bar of the hooking-frame, and the bracket E is pivoted to the plate U, Fig. 16. The tilting of the left-hand bracket E around its pivot U' on the plate U to remove the tension of the cloth when folded is effected by a link Q, Fig. 17, or other connection to the cocking-lever O'. Fig. 21 shows a clip A A^x in the highest position, and another clip in the lowest position with its spring A^x forced out and so in position to exert a nipping pressure against the fold of the cloth held between it and the clip A to the rear of it.

Having fully described our invention, what we desire to claim and secure by Letters Patent is—

1. In a cloth-folding apparatus, a series of spring-clips arranged one in front of another, a frame supporting the same, and means for causing them to engage successively with the folds of the cloth, so as to nip the said folds one by one without piercing the same as they are brought up to the clips by the operator, all combined for co-operation substantially as set forth.

2. In a cloth-folding apparatus, a series of spring-clips arranged one in front of another, a frame supporting the same, means for causing them to engage successively with the folds of cloth, so as to nip the said folds one by one without piercing the same as they are

brought up to the clips by the operator, and means for simultaneously releasing their hold upon the folds of cloth and for opening the said clips into the starting or cocked position, substantially as set forth.

3. In a cloth-folding apparatus, two sets of spring-clips, two frames arranged side by side and wherein the said clips are mounted, a bar whereon the said frames are fixed, guides for the clips in each set to slide in, a lever for raising each clip, such lever being jointed thereto and adapted to be raised for the purpose of opening the clip and lowered for the purpose of closing the clip, levers for simultaneously raising all the said clip-levers and clips, springs for lowering them, a trigger adapted to be slid in front of the clips, a catch operated by the trigger, and prongs for supporting the clip-levers, any of which prongs can be moved out of the way by the said trigger and catch for dropping any single clip, as required, substantially as set forth.

4. In a cloth-folding apparatus, two sets of spring-clips A A^{XL}, a frame E for each set, a bar K, whereon the frames are fixed, guides E⁴⁹ thereon for the said clips to slide in for the purpose of opening and closing, levers H⁷, having notches H¹⁷, spring-prong L' for supporting the same, the said prongs being adapted to be moved from under the levers H⁷ by a trigger, and a lever or lever-frame I I' for simultaneously raising or cocking the levers H⁷ and clips A A^{XL}, substantially as set forth.

5. In a cloth-folding apparatus, a set of spring-clips A A^{XL}, a frame E, wherein they are mounted and which is provided with guides E⁴⁹ for the clips to slide in, levers H⁷, having notches H¹⁷, the springs A^{XL}, the spring-prongs L', the pivoted trigger M, the catch-lever R, having notch R' and hooked end for taking hold of a prong L', a trigger-block N, to which the trigger M and lever R are connected and which is adapted to slide in guides for successively engaging with the clip-lever H⁷ and spring-prongs L', a lever or lever-frame I I' O' for raising all the levers H⁷ simultaneously, and a spring I² for bringing said lever down, the horn O² on lever O' for moving the block N by the intervention of the arm S⁴, lever S', and link S², and having a spring S for retracting the block, substantially as set forth.

6. Two frames E, mounted on a bar K, one frame E fixed thereon and the other pivotally connected thereto, in combination with levers O O' Q and rod P' for the purpose of rocking the pivoted frame and thus loosening the folds of the cloth, substantially as set forth.

7. In a cloth-folding apparatus, a series of clips A, with springs A^{XL}, guides E⁴⁹ for the spring-clips A A^{XL} to slide in and which have tapering projections that take against the side lugs A^{XX} on the springs for the purpose of closing the spring A^{XL} against the next

clip-blade A at its rear, in combination with means for raising and lowering said clips A^{XL}, substantially as set forth.

5 8. In a cloth-folding apparatus, a clip A, formed with slot A^o and having a spring A^{XL}, which is adapted to nip the fold of cloth between it and the slotted part of the next clip A to the rear of it, substantially as set forth.

10 9. In a cloth-folding apparatus, clips A, which are number-marked consecutively for the purpose of showing at a glance the num-

ber of folds formed and nipped, in combination with means, substantially as described, for causing the clips to drop one by one for the purpose of nipping a fold and for raising 15 them.

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Witnesses:

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G. L. BREWTNALL.