

No. 709,453.

Patented Sept. 16, 1902.

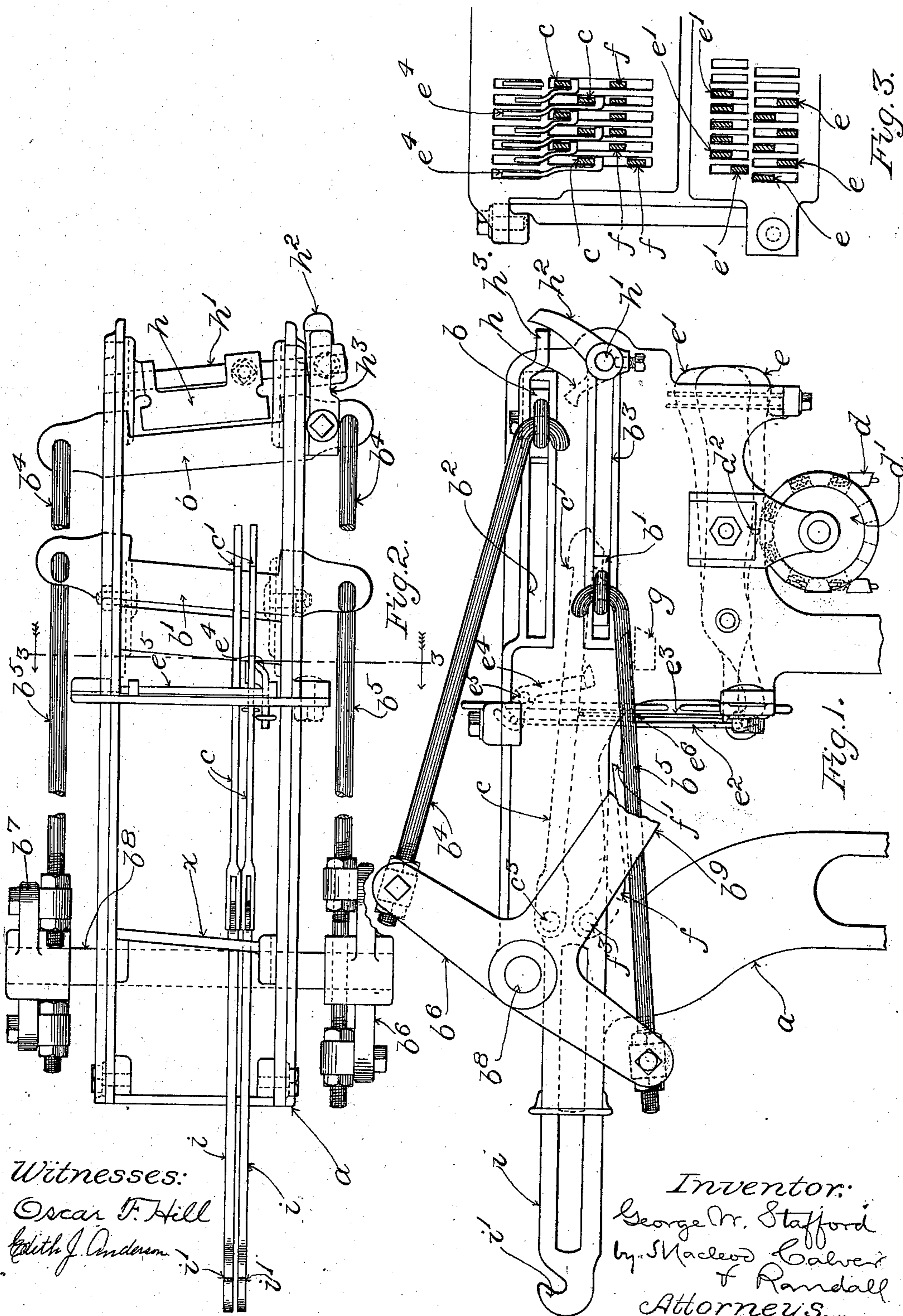
G. W. STAFFORD.

SHEDDING MECHANISM FOR LOOMS.

(Application filed Jan. 2, 1902.)

(No Model.)

4 Sheets—Sheet 1.



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4 Sheets—Sheet 2.

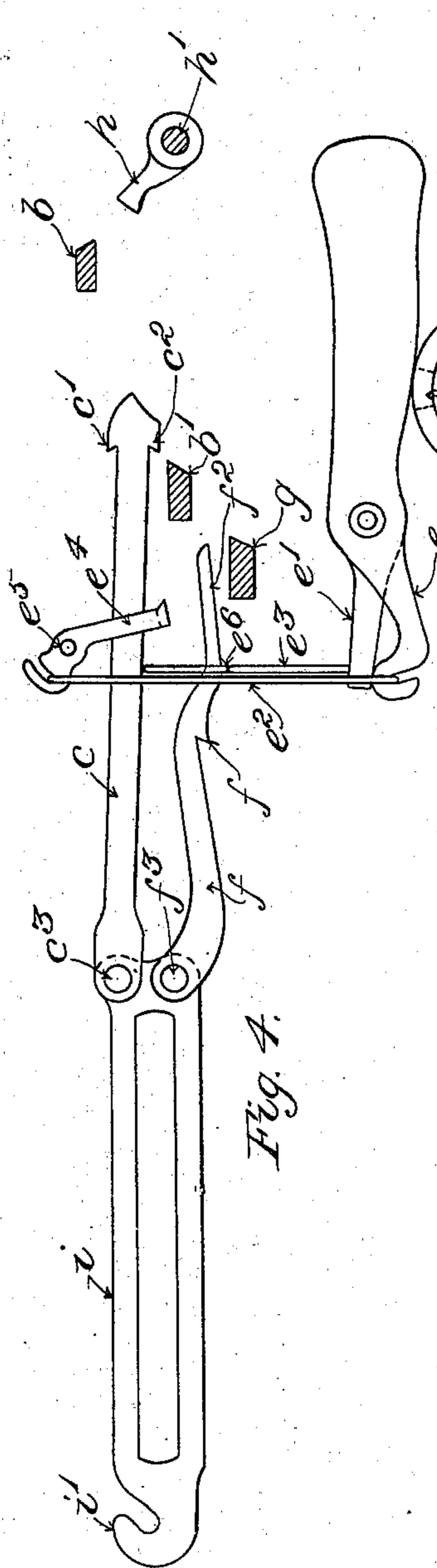


Fig. 4.

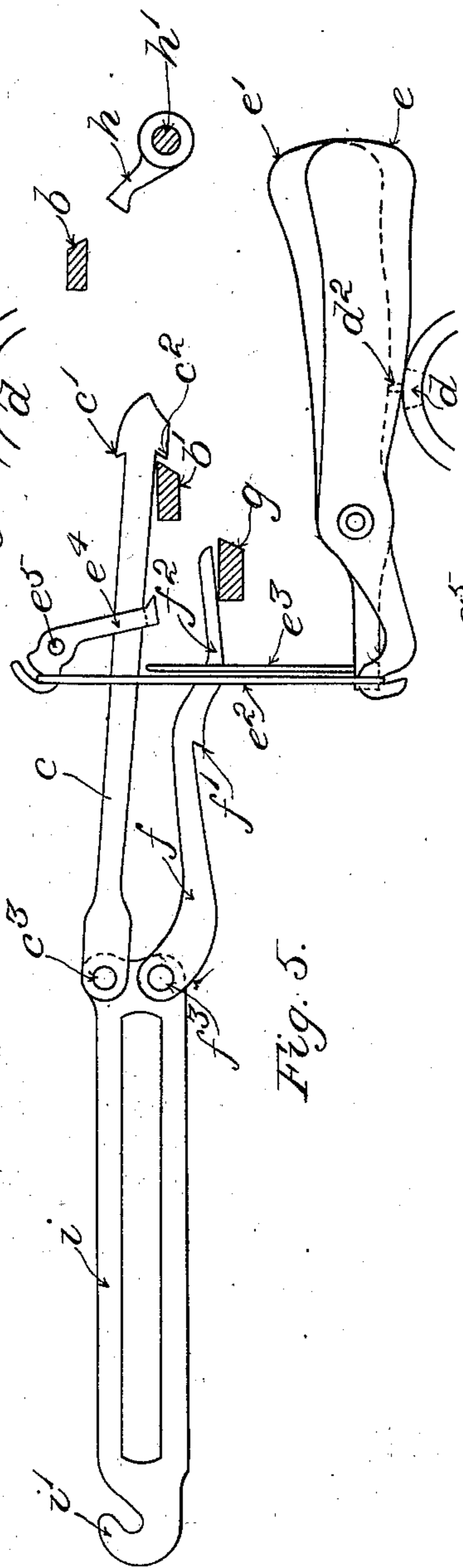


Fig. 5.

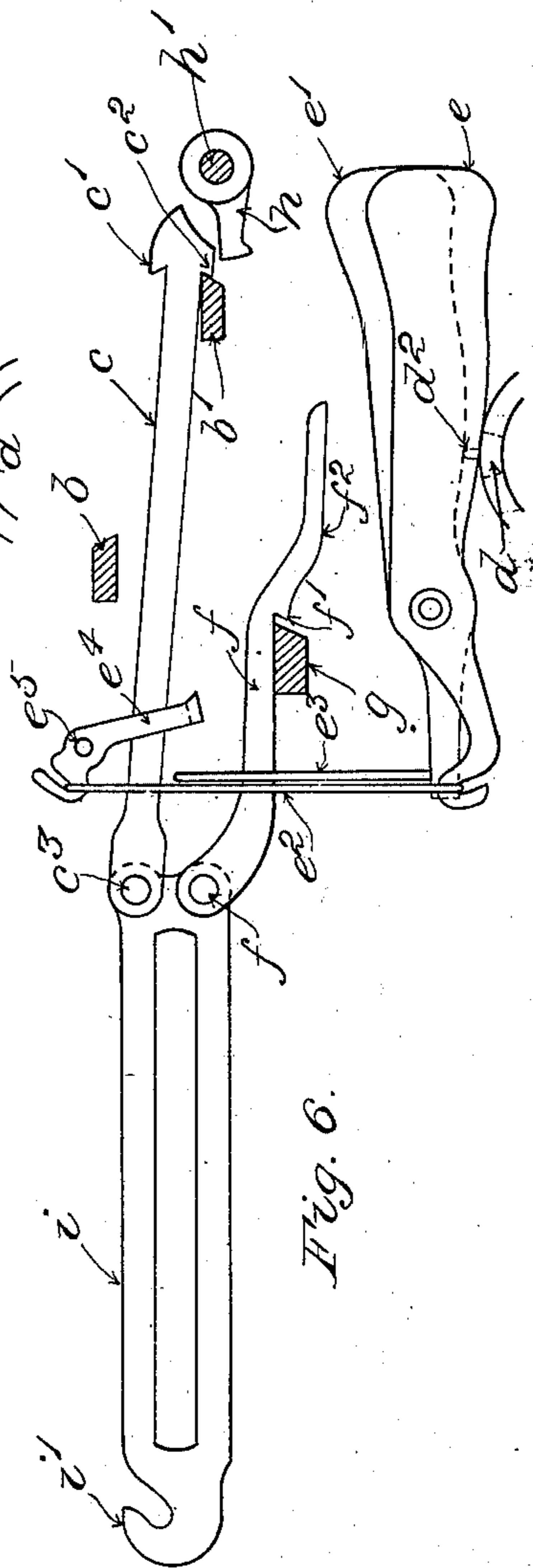


Fig. 6.

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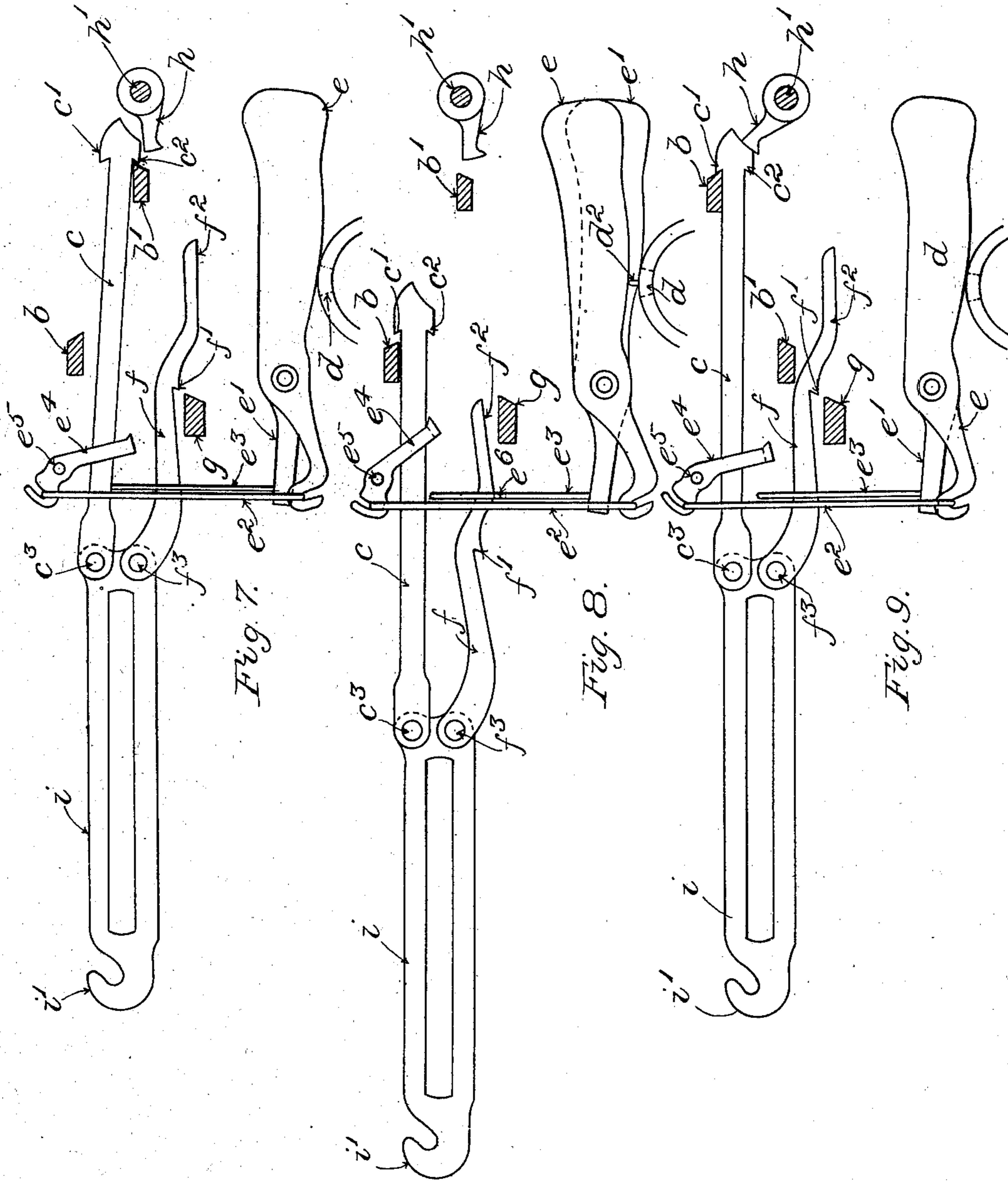
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4 Sheets—Sheet 3.



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4 Sheets—Sheet 4.

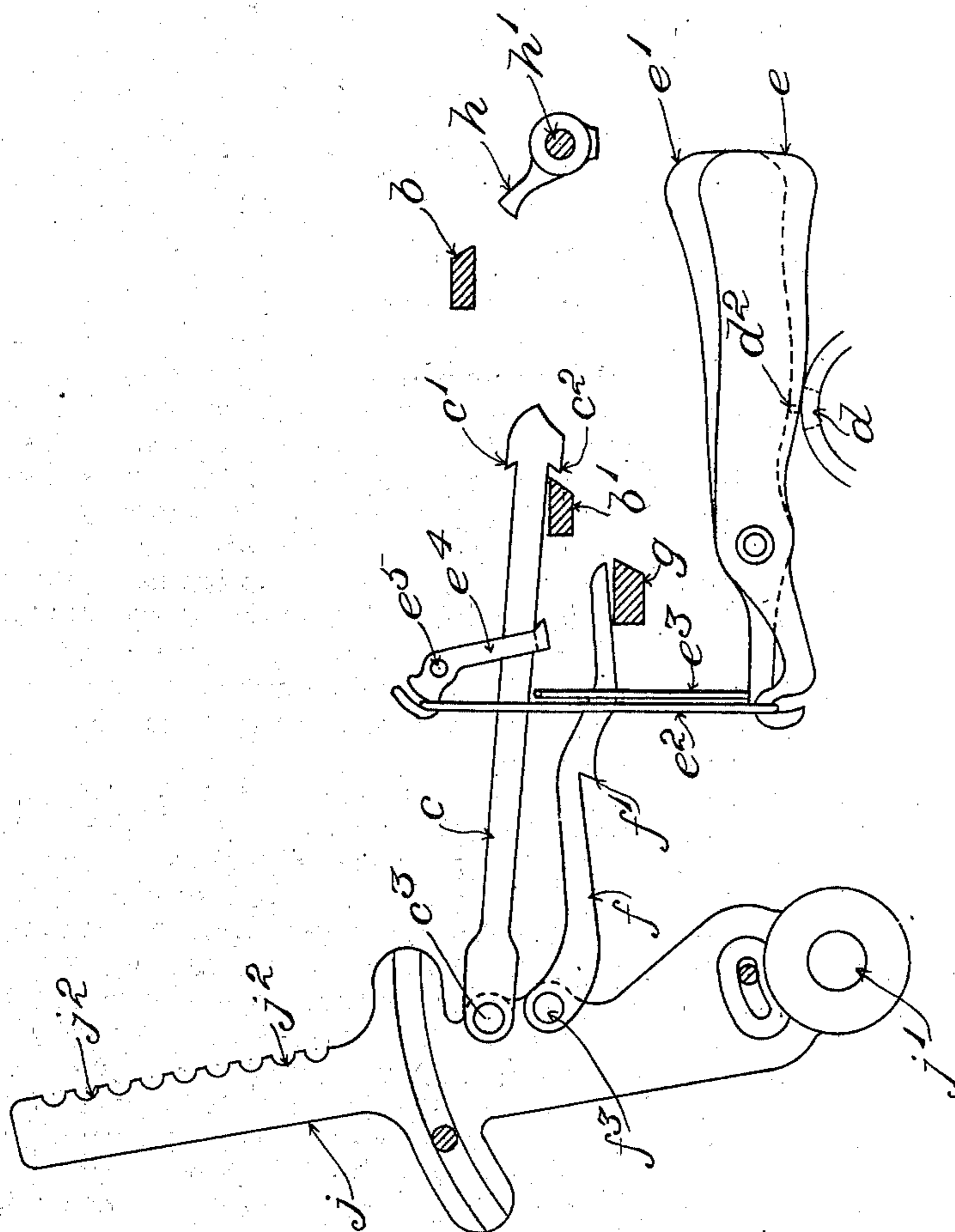


Fig. 10.

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UNITED STATES PATENT OFFICE.

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SHEDDING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 709,453, dated September 16, 1902.

Application filed January 2, 1902. Serial No. 88,038. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. STAFFORD, a citizen of the United States, residing at Bay-side, Warwick, in the county of Kent, State of Rhode Island, have invented a certain new and useful Improvement in Shedding Mechanisms for Looms, of which the following is a specification, reference being had therein to the accompanying drawings.

The general objects of the invention are to produce a double-acting open-shed shedding mechanism or dobby for looms having great capacity, but of simpler and more inexpensive construction than the double-acting shedding mechanisms or dobbies which are at the present time in use, and to secure greater compactness in order that less space than heretofore required may be occupied by the same, it being important, for one thing, that the said mechanism or dobby should project as little as possible laterally from the loom on which it is used, on account of the closeness with which looms are placed relative to each other in the weave-rooms of mills.

The invention has been designed with various special objects in view in addition, and these will be made apparent in the course of the following description.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 shows in side elevation a double-acting shedding mechanism or dobby embodying my invention. Fig. 2 shows the same in plan. Fig. 3 is a detail view, in vertical section, on line 3-3, Fig. 2. Figs. 4 to 9 are detail views on the order of diagrams illustrating the action of the said double-acting shedding mechanism or dobby. Fig. 10 shows another form of the invention.

Having reference to the drawings, framework pertaining to my improved dobby is shown at *a*. This may be of any suitable form and construction to fit the requirements of use and the views of builders and users.

I employ, as heretofore in double-acting dobbies, a pair of lifters *b b'*, reciprocating in guides *b² b³* in framework *a* and working oppositely with relation to each other. Any suitable arrangements for actuating the said lifters may be employed. Preferably the lift-

ers are connected, respectively, by the rods *b⁴ b⁵* with the upper and lower arms, respectively, of the rockers *b⁶ b⁷*, which are fixed upon the opposite ends of a rock-shaft *b⁸*, one of the said rockers—as, for example, *b⁶*—having an arm *b⁹*, with which in practice are connected power-transmitting devices (not shown) for the actuation of the rockers and lifters in proper timing. This is an old and well-known arrangement in common use. Any other suitable arrangement may be substituted.

The hooks which I employ in connection with the oppositely-moving lifters *b b'* in carrying my invention into effect are designated *c*. Only one such hook is shown in the main views of the drawings, together with the parts which are appurtenant to said hook or necessarily coöperate therewith, the remainder being omitted for the sake of clearness in the drawings. Each hook *c* is furnished with an upper shoulder, as at *c'*, to engage with the upper lifter *b*, and with a lower shoulder, as at *c²*, to engage with the lower lifter *b'*. The pattern-chain at *d*, which is shown passing around the pattern-cylinder *d'*, controls the engagement of the hook *c* with the respective lifters *b* and *b'* through the agency of a pair of pattern fingers or levers *e e'*, needles *e² e³*, and a lever *e⁴*, which is mounted upon a pivotal support *e⁵*. Needle *e³* intervenes between the upper side of the inner or shorter end of pattern-finger *e'* and the under side of the hook *c*. When the outer weighted end of said pattern-finger is permitted to occupy its lower position by the absence of a peg or pin from the portion of the pattern-chain which is presented beneath the same, the inner end of said pattern-finger holds needle *e³* raised. When the hook *c* occupies its normal or retracted position, as in Fig. 4, the lowered position of the finger *e'* and the resulting raised position of needle *e³* holds the hook *c* elevated into the intermediate position of said hook, as in said figure, in which position the hook clears both lifters *b* and *b'* and is not engaged by either thereof. A peg or pin *d²* on the pattern-chain coming beneath the pattern-finger *e'* just prior to the outgoing movement of the lower lifter raises its

weighted outer end, lowering the needle e^3 and hook c , as in Fig. 5, thereby placing the lower shoulder c^2 of said hook in position to be engaged by the lower lifter b' in the said outgoing movement of the lower lifter, so as to cause said hook to be carried out with the lower lifter b' by such movement of the latter, so as to occupy the position shown in Fig. 6. Needle e^2 is linked to the inner end of the pattern-finger e and to the shorter arm of the lever e^4 . The other or longer arm of said lever e^4 extends under the hook c . When the outer weighted end of the pattern-finger e is unsupported by a peg or pin on the pattern-chain, the lever e^4 is permitted to occupy its normal and inoperative position. (Shown in Figs. 1, 4, 5, 6, 7, and 9.) When the pattern-finger e is acted upon by a peg or pin of the pattern-chain prior to the outgoing movement of the upper lifter b , the needle or wire e^2 transmits movement to lever e^4 , and the latter acts to raise hook c , so as to place the shoulder c' thereof in position to be engaged by the upper lifter b in the next outgoing movement of the latter. (See Fig. 8.) It will be perceived that through the devices described the hook c may be caused to become engaged and actuated by either of the lifters b and b' to raise the corresponding harness-frame whenever required in shedding. For the purpose of enabling the harness-frame to be kept lifted for any required number of picks in succession I combine with the hook c a holding-hook f and provide a holding-bar g , with which said holding-hook f engages as the hook c reaches the extreme position to which it is moved by the action of the lifters. In order that the said engagement of the holding-hook f with the holding-bar g may be regulated and controlled, the holding-hook is placed under the control of the needle e^3 aforesaid, the said needle having a projection or shoulder at e^6 , Figs. 4 and 8, which extends under the holding-hook f . When needle e^3 occupies an elevated position, its projection or shoulder e^6 holds the holding-hook f raised out of engagement with holding-bar g . (See Figs. 4 and 8.) When needle e^3 is in its depressed position occasioned by the action of a peg or pin on the pattern-chain against the pattern-finger e' , it lowers the holding-hook f into position to engage with holding-bar g . (See Fig. 6.)

From the foregoing it will be perceived that a peg or pin under the pattern-finger e' at the time of the beginning of the outgoing movement of the lower lifter b' will cause hook c to be lowered into position to be engaged by said lower lifter b' , as in Fig. 5, so that the hook c will be carried outward with the latter from the position of Fig. 5 to that of Fig. 6, thereby raising the corresponding harness-frame. If there is a peg or pin beneath said pattern-finger e' when the said lower lifter b' begins to return, the holding-hook will be permitted to engage with the holding-bar, and thereby the harness-frame will be kept ele-

vated. If at such time, however, there is no such peg or pin beneath the pattern-finger acting to tilt the said pattern-finger and drop the needle e^3 , the shoulder or projection e^6 of the needle e^3 by its contact with the under side of the holding-hook f will raise the said holding-hook f out of engaging position above the holding-bar g . (See Fig. 7.) The upper extremity of the needle e^3 at this time will not quite reach the portion of hook c immediately above it, for a suitable amount of clearance is provided for between the under surface of hook c and the upper end of the needle e^3 . To secure such clearance, the pivot of hook c is elevated sufficiently with relation to the upper end of said needle so that thereby the under surface of the hook c , adjacent the pivot thereof, is raised somewhat relative to lower lifter b' . It will be perceived in Fig. 7 that the hook c at this time inclines upwardly from the lower lifter b' toward its inner end, pivoted at c^3 , so that the portion thereof now above needle e^3 is out of the reach of the latter. Consequently hook c will remain engaged with lower lifter b' and will be permitted to move inward with the lower lifter b' , causing the uplifted harness-frame to descend. Any previously-uplifted harness-frame which has been maintained in an elevated position for one or more picks through the engagement of the corresponding holding-hook f with the holding-bar g may be caused to descend at the time of the ingoing movement of the lower lifter b' simply by the absence of a pattern peg or pin from under its pattern-finger e' at the time when the lower lifter completes its outgoing movement and begins to return. This absence will permit the pattern-finger e' to assume the position which is shown in Fig. 7, raising needle e^3 and causing shoulder e^6 of the latter to uplift holding-hook f from the holding-bar g . A peg or pin under the pattern-finger e at the time of the beginning of the outgoing movement of the upper lifter b will cause lever e^4 to be turned so as to raise hook c into position to be engaged by the said upper lifter, as in Fig. 8, so that the hook c will be carried outward with the latter, thereby raising the corresponding harness-frame. If there is no peg or pin beneath the other pattern-finger e' when the upper lifter b begins its ingoing movement, the hook c will return with the said upper lifter; but if there is a peg or pin under the said pattern-finger e' then the holding-hook f will be permitted to engage with the holding-bar g , and the hook c will be held thereby in its outer position, with the corresponding harness-frame elevated. To the end that a previously-uplifted harness-frame which has been maintained in an elevated position through the engagement of the corresponding holding-hook f with the holding-bar g may be caused to descend at the time of the ingoing movement of the upper lifter b when necessary, I provide the devices which I will now proceed to describe.

At this shown what I term a "hook-shift" bar. It is arranged to coact with the hook *c*, and preferably, although not necessarily in all cases, it is located at the outer limit of the movement of the said hooks and is caused to engage with the extreme outer portions of the said hooks. Figs. 6 and 7 show the same in its depressed position below the free extremity of a hook *c*, which has just been drawn outward by the action of the outgoing lower lifter *b'*. This hook-shift bar is moved upward prior to the completion of each outgoing movement of the upper lifter *b* into the position shown in Figs. 1, 4, 5, and 9, and in being thus moved it carries into position to be engaged by the said upper lifter as the latter reaches its extreme outward position all hooks *c* which occupy their outer position and are not already engaged by the upper lifter. The timing of the parts and extent of the outgoing movement of the upper lifter preferably are such as in the present embodiment of the invention to cause the hooks *c* which are acted upon by the hook-shift bar and lifted thereby to become engaged with the upper lifter just prior to the completion of the outward movement of the latter. Thereby the hooks thus lifted and engaged are caused to partake of a slight portion of the outgoing movement of the upper lifter, which relieves the pressure of the engaging portions of the corresponding holding-hooks *f* against the holding-bar *g*. This renders the said holding-hooks *f* free to be moved by the action of the corresponding pattern-fingers *e'* in case the absence of pegs or pins from beneath the said pattern-fingers *e'* indicates that the corresponding elevated harness-frames should descend. As will be obvious to those who are skilled in the art, the relief of the holding-hooks *f* by relative movement between the same and the holding-bar *g* sufficient to facilitate the disengagement of the said holding-hooks from the said holding-bar by the action of the pattern-fingers *e'* is capable of being effected in various manners. Therefore, while for some reasons and purposes I prefer the illustrated means and manner of effectuating the relief, I do not restrict myself in all cases thereto. In Fig. 9 the absence of a peg or pin beneath pattern-finger *e'* has permitted the said pattern-finger to raise needle *e³* and lift holding-hook *f* above the holding-bar *g*. The corresponding hook *c* being in engagement with upper lifter *b*, the said hook will accompany the said lifter during the ingoing movement of the latter in consequence of the spring which acts to draw down the harness-frame, (not shown,) with which said hook *c* is connected, and thereby said harness-frame will be lowered from its elevated position to its depressed position.

The manner of mounting and operating the hook-shift bar *h* may vary in practice. In the present embodiment of the invention it is mounted upon a rock-shaft *h'*, which is journaled in the side frames of the framing *a*

of the dobby, and said rock-shaft *h'* is arranged to be actuated in one direction by the upper lifter *b* in the outgoing movement of the latter and in the other direction by the unbalanced weight of the hook-shift bar. Thus the rock-shaft *h'* has attached to one end thereof an upwardly-extending arm *h²*, and to the corresponding end of the upper lifter is attached a horizontally-projecting arm or bunter *h³*, which encounters said arm *h²* as the upper lifter nears the outer extreme of its outgoing movement. This affords a simple means of actuating the hook-shift bar. In the present construction the upward swing of the hook-shift bar carries it partially out from under the extremity of hook *c* after the hook has become seated against the upper lifter *b*, as shown in Fig. 9. The said extremity is shaped as shown in said Fig. 9, so as to accommodate this portion of the movement of the hook-shift bar. This, however, is not a material feature.

It is important that during the inward movement of the hook *c* with the ingoing upper lifter *b* from the position which is represented in Fig. 9 the companion holding-hook *f* should be so guided as to prevent its engaging shoulder *f'* from encountering the shoulder or projection *e⁶* of needle *e³*. During the first part of this movement of hooks *c* and *f* the said shoulder or projection *e⁶* supports the said holding-hook *f*. To the foregoing end means is provided for uplifting the hook *f* until after shoulder *f'* thereof has passed shoulder or projection *e⁶* of needle *e³*. The desired result may be attained in more than one way without departing beyond the limits of my invention; but preferably I prolong the hook *f* beyond its shoulder *f'* and form the prolongation thereof with a cam-surface, as shown at *f²*, which by engagement with a proper abutment, here relatively fixed and constituted by the holding-bar *g*, causes the hook *f* to rise relatively to the shoulder or projection *e⁶* of the needle *e³* sufficiently to enable shoulder *f'* of the hook to clear said shoulder or projection *e⁶*.

The manner of combining a hook *c* and its companion holding-hook *f* with each other and connecting the same with a harness-frame may vary in practice. In Figs. 1 to 9 I have represented the said parts as pivotally connected at their inner ends, at *c³* and *f³*, to the outer end of a transmitter that is constituted by a slide-bar *i*, which last is hooked at its inner end, as at *i'*, to receive cording (not shown) or other connections leading to the corresponding harness-frame. (Not shown.) When slide-bars *i* are used, the required V-shaped in the warps is provided for by transmitting a greater throw from rocker *b⁶* to the corresponding ends of the lifters *b* *b'* than from rocker *b⁷* to the other ends of said lifters. This is effected by connecting the rods *b⁴* *b⁵* with the arms of rocker *b⁶* at greater distances from the axis of rock-shaft *b⁸* than in the case of rocker *b⁷*. Holding-bar *g*, back

girth x , by which the inward movement of the hooks and slide-bar z is limited, and hook-shift bar h are arranged in transversely-inclined positions corresponding with those of the two lifters at the opposite extremes of their strokes, as indicated in Fig. 2.

In Fig. 10 I have represented in vertical section an embodiment of the invention in which the hook c and holding-hook f are pivotally connected with a transmitter that is constituted by an upright harness-lever j , the latter being mounted at its lower end upon a rod j' and having its upper end notched at j^2 for the reception of harness-cording. For some reasons I prefer this embodiment in practice, inasmuch as the levers occupy somewhat less space in the direction of their movement than the slides of the other views and inasmuch as all the required variation in the extent of movement of the respective harness-frames that is necessary for the production of a V-shed admits of being secured by applying the harness-cording to notches at different distances from the fulcrum of the said harness-levers. This latter capacity renders unnecessary the angular or inclined position of back girth x and hook-shift bar h and the angular swinging movement of the lifters which are required in the case of the construction that is illustrated in Figs. 1 and 2.

I claim as my invention—

1. In double-acting shedding mechanism for looms, in combination, the two lifters, the hook between said lifters, having engaging shoulders at its opposite edges, and adapted to be operated by either lifter to elevate the corresponding harness-frame when required, pattern devices to control the engagement of the said hook with the required lifter, and separate holding means for locking under the control of the pattern devices said harness-frame in its elevated position, substantially as described.

2. In double-acting shedding mechanism for looms, in combination, the two lifters, the hook between said lifters, having engaging shoulders at its opposite edges, and adapted to be operated by either lifter to elevate the corresponding harness-frame, pattern devices to control the engagement of the said hook with the respective lifters, and, a holding-hook, controlled by the said pattern devices, and adapted to lock the harness-frame in its elevated position, substantially as described.

3. In double-acting shedding mechanism for looms, in combination, the alternately-acting lifters, the hook between said lifters and having engaging shoulders at its opposite edges, the holding-hook partaking of the movements of the first-mentioned hook in shedding, the holding-bar cooperating with said holding-hook, and, pattern devices to control the engagement of the first-mentioned hook with the respective lifters and also control the engagement of the said holding-hook with said holding-bar, substantially as described.

4. In double-acting shedding mechanism for looms, in combination, the alternately-acting lifters, the hook between said lifters and having engaging shoulders at its opposite edges, the movable transmitter adapted to be connected with the corresponding harness-frame and having said hook movably connected therewith, the holding-hook also movably connected with the said transmitter, the holding-bar cooperating with said holding-hook, and pattern devices controlling the engagement of the first-mentioned hook with the respective lifters and also controlling the engagement of the said holding-hook with said holding-bar, substantially as described.

5. In double-acting shedding mechanism for looms, in combination, the alternately-acting lifters, the hook between said lifters and having engaging shoulders at its opposite edges, the harness-lever having said hook connected thereto, the holding-hook also connected to the said harness-lever, the holding-bar cooperating with said holding-hook, and pattern devices controlling the engagement of the first-mentioned hook with the respective lifters and also controlling the engagement of the said holding-hook with said holding-bar, substantially as described.

6. In double-acting shedding mechanism for looms, in combination, the two lifters working alternately, the hook between said lifters having shoulders at its opposite edges for engagement with the respective lifters, a pattern-surface, a pattern-finger coacting with said pattern-surface and means intermediate the same and said hook to control the engagement of the said hook with one of said lifters, and a second pattern-finger coacting with the said pattern-surface and means intermediate the same and the said hook to control the engagement thereof with the other lifter, substantially as described.

7. In a double-acting shedding mechanism for looms, in combination, the two lifters acting alternately, the double hook between said lifters, a pattern-surface, a pair of pattern-fingers, a needle between one of said pattern-fingers and said hook, a needle and lever between the other of said pattern-fingers and said hook, substantially as described.

8. In double-acting shedding mechanism for looms, in combination, the two lifters, the double hook between said lifters, a pattern-surface, a pattern-finger and means intermediate the same and said hook to control the engagement of the said hook with one of said lifters, a second pattern-finger and means intermediate the same and the said hook to control the engagement thereof with the other lifter, and means to hold the harness-frame which is operated by the said hook locked in the elevated position thereof, substantially as described.

9. In double-acting shedding mechanism for looms, in combination, two lifters acting alternately, a double hook between said lift-

ers and adapted to be engaged with either lifter, a holding-hook, a pattern-surface, a pair of pattern-fingers and means for operating the holding-hook therefrom and also transmitting movement to the double hook from the respective pattern-fingers, in opposite directions, respectively, to occasion the engagement of said double hook with the respective lifters, substantially as described.

10 10. In double-acting shedding mechanism for looms, in combination, two lifters acting alternately, a double hook between said lifters, a movable transmitter adapted to be connected with a harness-frame and having
15 said hook movably connected therewith, a holding-hook also movably connected with the said transmitter, the relatively stationary abutment engaged by said holding-hook, a pattern-surface, a pair of pattern-fingers
20 and means for operating the holding-hook therefrom and also transmitting movement to the double hook from the respective pattern-fingers, in opposite directions, respectively, to occasion the engagement of said
25 double hook with the respective lifters, substantially as described.

11. In double-acting shedding mechanism for looms, in combination, two lifters acting alternately, a double hook between said lifters, a harness-lever having said hook connected thereto, a holding-hook also connected to the said harness-lever, the relatively stationary abutment engaged by said holding-hook, a pattern-surface, a pair of pattern-fingers and means for operating the holding-hook therefrom and also transmitting movement to the double hook from the respective pattern-fingers, in opposite directions, respectively, to occasion the engagement of
40 said double hook with the respective lifters, substantially as described.

12. In a double-acting shedding mechanism for looms, in combination, two lifters acting alternately, a double hook between said lifters, a holding-hook, a pattern-surface, a pair of pattern-fingers, a needle operated by one of said pattern-fingers and controlling the two hooks, and a needle and lever operated by the other of said pattern-fingers and controlling the hook first mentioned, substantially
50 as described.

13. In double-acting shedding mechanism for looms, in combination, the upper and lower lifters acting alternately, the hooks between said lifters, the pattern devices constructed to cause said hooks to occupy normally an intermediate disengaged position, and arranged to indicate the hooks into engagement with the respective lifters at the
55 required times for the elevation of the harness-frame, and means independent of the pattern devices acting upon the said hooks to connect with the upper lifter at the outer extreme of its stroke the hooks which should accompany
60 the said lifter in its ingoing movement for the purpose of lowering the corresponding harness-frames, substantially as described.

14. In double-acting shedding mechanism for looms, in combination, the upper and lower lifters acting alternately, the hooks co-
70 operating with the said lifters, the pattern devices provided with a pattern-surface having pegs or pins to indicate for the elevated position of the harness-frames, and means independent of the pattern devices to raise
75 into engagement with the upper lifter at the outer extreme of its stroke the hooks pertaining to uplifted harness-frames and not already engaged with said lifter, to thereby connect
80 with the latter hooks which should accompany said lifter in its ingoing movement, substantially as described.

15. In a double-acting shedding mechanism for looms, in combination, the two lifters acting alternately, the series of hooks cooperating with the said lifters, locking means whereby the harness-frames may be held in their elevated position for two or more picks, pattern devices controlling the engagement of
85 said series of hooks with the lifters to occasion the elevation of the harness-frames, and the action of the said locking means, and means independent of the pattern devices, to connect with the upper lifter at the outer extreme of its lift the hooks pertaining to elevated harness-frames which should accom-
90 pany said upper lifter in its ingoing movement, substantially as described.

16. In a double-acting shedding mechanism for looms, in combination, the two lifters acting alternately, the series of hooks cooperating with the said lifters, locking means whereby the harness-frames may be held in their elevated positions for two or more picks, pattern devices controlling the engagement of
105 said series of hooks with the lifters to occasion the elevation of the harness-frames, and the action of the said locking means, and the hook-shift bar to place the hooks pertaining to elevated harness-frames in position to en-
110 gage with the upper lifter, substantially as described.

17. In a double-acting shedding mechanism for looms, in combination, the two lifters acting alternately, the series of hooks cooperating with the said lifters, the holding-hooks, the pattern devices whereby the engagement of the hooks of said series with the respective lifters is controlled, and also the action of
115 said holding-hooks, and means independent of the pattern devices to connect with the upper lifter at the outer extreme of its lift the hooks pertaining to elevated harness-frames which should accompany said upper lifter in its ingoing movement, substantially as de-
120 scribed.

18. In a double-acting shedding mechanism for looms, in combination, the two lifters acting alternately, the series of hooks cooperating with the said lifters, the holding-hooks, the pattern devices whereby the engagement of the hooks of said series with the respective lifters is controlled and also the action of said holding-hooks, and the hook-shift bar to place
130

the hooks pertaining to elevated harness-frames in position to engage with the upper lifter-bar, substantially as described.

19. In shedding mechanism for looms, in
5 combination, a hook adapted to be connected
operatively with a harness-frame, a lifter to
operate said hook, pattern devices to control
the engagement of said hook by said lifter,
a holding-bar, and a holding-hook partaking
10 of the movements in shedding of the hook,
first mentioned, engaging with said holding-
bar under control of said pattern devices and
provided with means to cause its shoulder to
clear in the receding movement the member
15 of the pattern devices which contacts with the
holding-hook, substantially as described.

20. In shedding mechanism for looms, in
combination, a hook adapted to be connected
operatively with a harness-frame, a lifter to
20 operate said hook, pattern devices to control
the engagement of said hook by said lifter,
a holding-bar, and a holding-hook partaking
of the movements in shedding of the hook
first mentioned, engaging with said holding-

bar under control of said pattern devices, and 25
provided with the cam to cause its shoulder
to clear in the receding movement the mem-
ber of the pattern devices which contacts with
the holding-hook, substantially as described.

21. In shedding mechanism for looms, in 30
combination, a hook adapted to be connected
operatively with a harness-frame, a lifter to
operate said hook, pattern devices controlling
the engagement of said hook by said lifter and
including a movable needle, a holding-bar, 35
a holding-hook coöperating with said holding-
bar, engaged by said needle, and having a
cam-face which in the rearward movement
of the holding-hook causes the shoulder there-
of to clear the said needle, substantially as 40
described.

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

GEORGE W. STAFFORD.

Witnesses:

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