

No. 816,535.

PATENTED MAR. 27, 1906.

R. CROMPTON.
SHED FORMING MECHANISM FOR LOOMS.

APPLICATION FILED FEB. 20, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

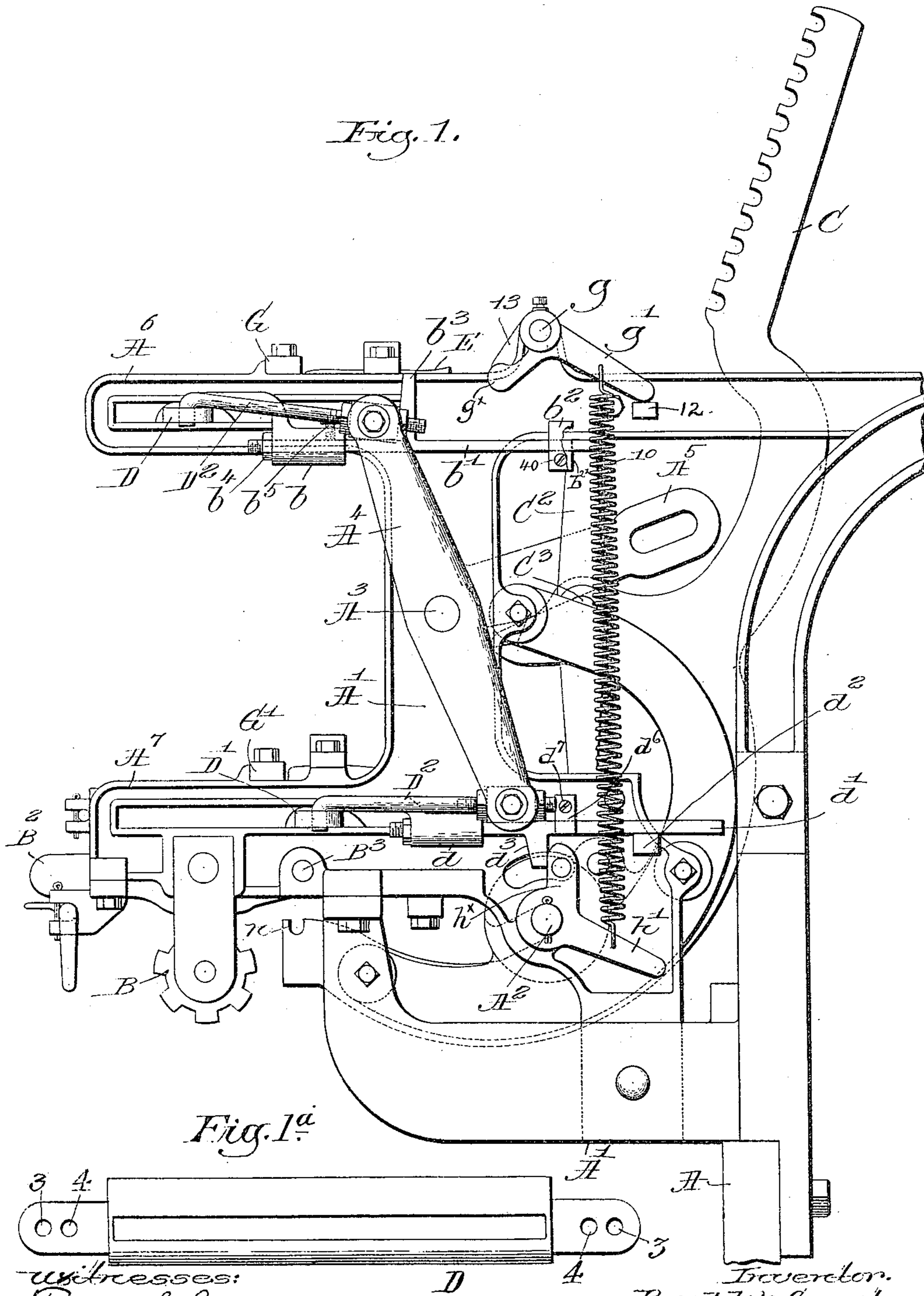


Fig. 1^a.

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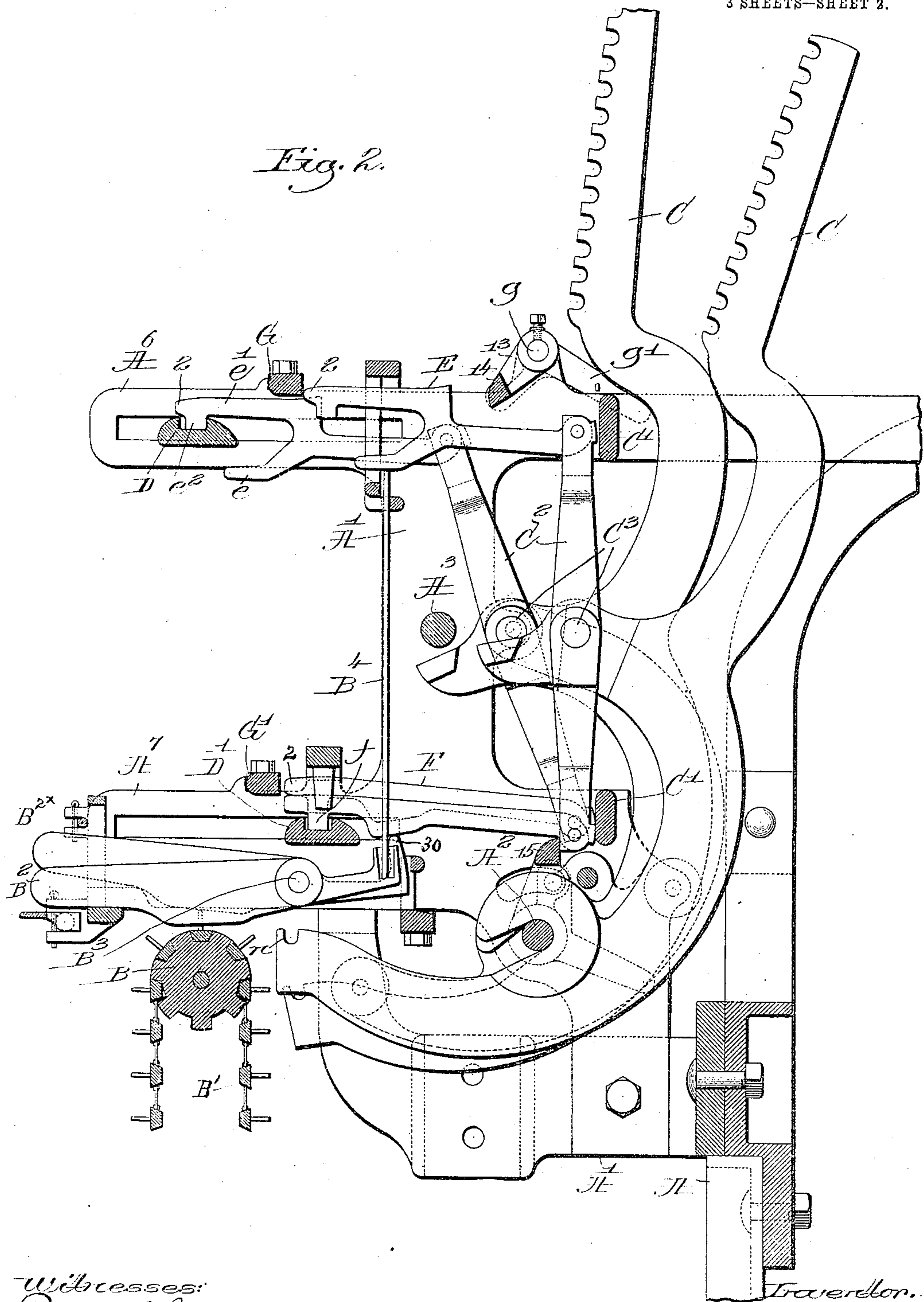
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3 SHEETS—SHEET 2.



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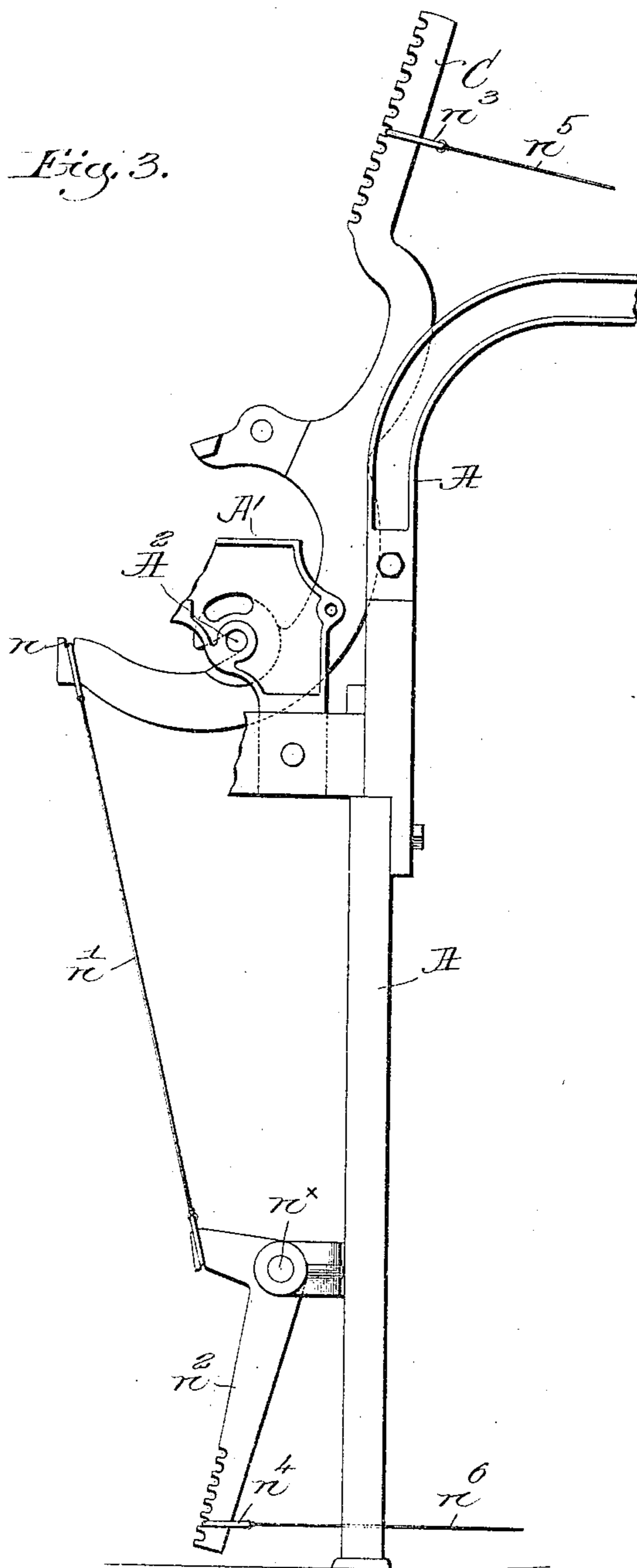
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3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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SHED-FORMING MECHANISM FOR LOOMS.

No. 816,535.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed February 20, 1905. Serial No. 246,416.

To all whom it may concern:

Be it known that I, RANDOLPH CROMPTON, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented an Improvement in Shed-Forming Mechanism for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to shed-forming mechanism for looms, and has for its object to provide a novel means for actuating the jacks positively.

I have shown my invention as applied to that class of looms usually designated as "dobbies."

In accordance with my invention each hook connected with the opposite ends of the usual levers pivoted on and moving the jacks about their fulcra is adapted to engage and be moved by a knife which is moved in the formation of a shed, and the outer end of each hook which is elevated by or through the action of the pattern mechanism and not to be moved by a knife abuts one or another stop located above and parallel with relation to said knife.

I prefer to provide the hooks with lugs that enter grooves of the knives and have provided means for releasing the lugs from the walls of the grooves in the knives preparatory to shifting the hooks for a change in the shed.

Figure 1 in side elevation represents a sufficient portion of a loom with my improvements added to enable my invention to be understood, the figure showing but one jack. Fig. 1^a shows in plan view one of the knives detached. Fig. 2 is a section showing two jacks, each in its extreme position in one direction of its movement. Fig. 3 shows one of the devices or sheave-levers interposed between a jack and also parts of connections with a harness-frame.

In the drawings, A represents part of a loom-frame; A', a head-frame bolted thereto; A², a jack-fulcrum; A³, a rock-shaft mounted in the head and having connected with its ends knife-moving levers A⁴, (but one shown in Fig. 1,) the lever at the opposite end of said shaft having a third arm A⁵, which is slotted at one end for the connection therewith of

the usual rod (not shown) moved by a cam or otherwise to turn said shaft A³. B represents a pattern-chain carrier; B', a pattern-chain thereon; B² B^{2x}, weighted fingers pivoted at B³, the fingers B² having pockets at their inner ends to receive needles or rods B⁴, the upper ends of which sustain the heels of hooks, to be described, the fingers B^{2x} having portions 30 to meet the under sides of hooks F, the jacks C, mounted on the fulcrum A², the head-frame extensions A⁶, having slots, as shown, to receive and guide the novel knives, to be described, and the stop-bars C', against one or the other end of which the levers C², pivoted at C³ on the jacks C, are made to contact at times, as will be described, are and may be all of usual construction.

The two knives D D', that are to engage and move the hooks E and F, are shown as slotted at their upper sides, (see Fig. 2,) and the side walls of the slots are shown as substantially vertical.

Each knife (see Fig. 1^a) has holes 3 4 at its opposite ends, and the holes 3 are entered by like links D², adjustably connected with the opposite ends of like arms A⁴, secured to shaft A³, there being such an arm at the opposite ends of said shaft outside the head-frame, and as the arms are turned in usual manner the links reciprocate the knives in the slots of the extensions A⁶ A⁷.

The upper end of each lever C² has jointed to it a hook E, while at its lower end said lever has jointed to it a hook F. The hooks E, as herein represented, have each a heel *e* and a finger *e'*, from which depends a lug *e*², and I designate by the term "toe" the leading end 2 of each hook E and F. The hooks F are shaped somewhat differently from the hooks E, but have each a lug *f*. The lugs *e*² and *f* may be dropped automatically into the grooves of the knives D or D', as the pattern-chain demands, or they may be elevated from said grooves when the pattern-surface demands. The movement of a hook to enter one or the other of said grooves takes place when the knife is in its inward position, as shown by the lower knife D'. When the lug of a hook E is out of the groove of knife D, the upper end of the needle or rod B⁴, acting on the heel *e* of said hook, will so lift the same that the toe 2 of the hook abuts the inner side of the cross-bar G, connected with the

extension A^6 , there being a like cross-bar G' crossing the hooks F from one to the opposite extension A^7 .

The holes 4 of each knife D are entered by
 5 a projection at one end of a coupling b , with which is connected one end of a kicker-rod b' , having a lug b^3 , there being a like kicker-rod b' at each side of the head-frame, the drawings, however, showing but one such kicker-rod. The kicker-rods are slidable in a suitable guide comprising a plate b^2 and a lug b^{2x} , immediately behind the same and depending from the framework A^6 , said plate being held in place by a screw 40. The kicker-rod may
 10 be adjusted in the coupling by a nut b^4 , screwed onto a threaded portion of said rod, and when the rod is adjusted to position the lug b^3 at the proper distance or in the proper relation to the part to be moved by it it will
 20 be fastened in the coupling by a set-screw b^5 . The hole 4 in the knife D' has jointed with it the ends of a similar coupling with which is adjustably mounted a kicker-rod d' , (but one such rod being herein shown,) said rod being
 25 sustained by a guide d^2 and having a lug d^3 . The rod d' is kept on the guide d^2 by an overlapping plate d^6 , held by a screw d^7 .

The head-frame at opposite sides has suitable bearings to sustain the rock-shaft g , provided at opposite ends with a like lever g' .
 30

The shaft g receives and has secured to it the arms 13 of a releasing device 14, shown as a bar, that when the lugs b^3 , one to each kicker-rod, meet the short arms g^x of the
 35 levers g' , turns said shaft and causes the releasing device to meet the upper ends of the levers C^2 .

The fulcrum A^2 has mounted loosely thereon at each end a like lever h' , the opposite
 40 levers being connected by a releasing device 15, shown as a bar, adapted when the levers are moved to engage the lower ends of the levers C^2 , said levers h' being moved by the lugs d^3 as the kicker-rod meets the short
 45 arms h^x of said levers.

A spring 10 connects the levers g' and h' , as shown in Fig. 1. A stop 12 serves to arrest the movement of lever g' by the spring 10 when the levers h' are moved by the lugs
 50 d^3 of the kicker-rods d' , it being understood that as the kicker-rods b' moves the levers g' the spring 10 moves the levers h' and the releasing device 15 in the opposite direction, and vice versa, so that the releasing devices
 55 are moved alternately to contact one with the upper ends of the levers C^2 and the other with the lower ends of said levers prior to redistributing the hooks E F , so that the inner or right side edges of the lugs e^2 and f , said
 60 knives D D' then occupying their inward positions, may be released from the walls of said knives. The jacks C instead of being, as usual, of equal length at their opposite ends are provided with short lower ends having
 65 but a single notch n .

A jack C , constructed as shown, takes up less room and is less bulky to move and is easier to construct and keep in shape than a longer jack.

The notches n at the lower ends of the
 70 short arms of the jacks C are united by connections n' (see Fig. 3) with notches at the ends of intermediate devices or sheave-levers n^2 , mounted on a rod n^x , sustained by a stand fixed to the loom side. The upper
 75 ends of the jacks have the usual notches, and the lower ends of the levers n^2 each have a series of notches, with either of which may be engaged the usual loops n^3 n^4 , and the connections n^5 n^6 , with which said loops are at-
 80 tached, are passed over usual sheaves and secured in usual manner to harness-frames. (Not shown.)

Owing to the fact that the ends of the jacks are of unequal length, necessitates the
 85 employment of the sheave-levers n^2 to insure that the connections n' operate correctly with the connections n^5 n^6 , which are joined with the harness-frames, as stated, or, in other words, the employment of the
 90 sheave-levers insures an equalization of movement of the harnesses corresponding with the extent of movement of the jacks.

In practice the toe 2 of each set of hooks E and F when the lugs of said hooks are not en-
 95 gaged in the grooves of the knives substantially touch the inner sides of the cross-bars G and G' , as shown by the hooks E . Viewing Fig. 2 the knife D' is shown as having completed its inward movement or its move-
 100 ment to the right, but while the knife was coming from its extreme outward position at the left into the position shown in Fig. 2 the left-hand edge of the hook contacted with the left-hand wall of the groove. It is
 105 while the knife D' (it might be either knife) occupies its inward position, as shown by the knife D' , that the fingers D^2 are moved to distribute the jacks. It will be understood that the walls of the knives as the latter are mov-
 110 ing inwardly contact so firmly with the outer edges of said lugs that the hooks could not be practically lifted to be disengaged from the knives, so the releasing devices were pro-
 115 vided for removing said outer edges of the lugs from contact with said knives before distributing the hooks, and after this is done, as will be described, the knives being at such time stationary, the distribution of the hooks may be easily effected.
 120

To release the right-hand or inner edges of the lugs f of the hooks F from the wall of the knife D' just before the distribution of said
 125 hooks, the lug d^3 of the kicker-rod d' , it then moving to the right, Fig. 1, meets the short arms of the levers h' and turns the same, causing the releasing device 15, connected with said levers, to meet the lower ends of the levers C^2 , pivoted on the jacks F , thus pushing
 130 the lower ends of said levers to the right

far enough to break the contact between the left-hand sides of the lugs f with the left-hand wall of the knife. This same operation takes place when the knife D, starting from its extreme outward position in Fig. 2, arrives in its extreme inward position, at which time the lug b^3 of the kicker-rod b' meeting the short downturned arms g^x of the levers g' turns the same and causes the releasing device 14 to meet the left-hand side of the upper ends of the levers C^2 and moves them sufficiently to release the left-hand sides of the lugs e^2 from the left-hand side of the groove in the knife D.

It will be noticed from the foregoing description that each releasing device by acting on the ends of the levers C^2 also causes the removal from contact with one or the other cross-bar of the ends 2 of all the hooks which then occupy an elevated position. When a knife occupies its inward position, as represented by the knife D' , it will be seen that not only can a lug be easily lifted from the groove of the knife, but also that the toes of the lifted hooks then removed from contact with the cross-bar may drop freely and enter accurately the groove of the knife without contact with either wall of said groove.

In practice the strain exerted on each harness-frame of a loom by the warp-threads when moved to either plane of the shed has a tendency to turn the jacks into the position they would occupy when all the warp ends are in one plane or leveled, and this tendency of the jacks to be so moved must be overcome, and to prevent this movement of the jacks whose hooks are not engaged by a knife I have provided stationary cross-bars G and G' , so located with relation to the line of movement of the knives that one and the same cross-bar acts for the purpose stated with all the hooks of each set, and it will be seen that the toe 2 of each hook not engaged by a knife will abut one or the other of the cross-bars whenever a releasing device is not in contact with one end of one of the levers C^2 , and the hooks which are engaged with a knife will be drawn under a cross-bar and be prevented thereby from being disengaged from the knife as the latter is being moved in one or the other direction. It will be obvious when a jack having a hook E occupies its outward position and is to be changed (viewing Fig. 2) that the cross-bar G will prevent the rising of the hooks thus engaged with the knife D, so that said hook cannot escape from said knife, and so, also, the toes 2 of the hooks that are lifted abut the side of the stationary cross-bar. When any of the series of hooks E engaged by the knife D and holding the jacks connected therewith in a position to lift a harness-frame are to be disengaged from the knife to permit the elevated harness-frames to be lowered, it is necessary to use the cross-bar G' as an abutment for the hook

F, attached to the lever C^2 , pivoted on the same jack during the time that the knife D is being moved from its outward into its inward position; otherwise the hook F would move forward and the jacks would be left free to be held up by the strain of the warp and the harness-frame could not lower the warp held by it into the lower plane of the shed.

The hooks E are reduced in their depth, as represented in Fig. 2, to enable the releasing device 14 to be moved at the proper time, and it will be noticed that the releasing device 15 is extended upwardly from its rock-shaft.

I have illustrated my invention as provided with a finger for each hook; but it will be understood that I may, if desired, use one finger to control both an upper and lower hook, both kinds of fingers being common.

In accordance with my invention the releasing devices impart an extra movement of motion after the hooks have been moved inwardly or to the right by the knives to thereby disengage positively the hooks from frictional engagement with the knives of whatever construction. I believe that I am the first to provide a lever with means for so releasing the hooks from contact with the knives or from a device for holding them depressed before distributing the hooks for a new shed, and I desire to claim this feature broadly.

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

1. In a loom, a series of jacks, levers pivoted thereto and provided at their opposite ends with hooks having lugs, knives grooved longitudinally to receive the lugs, and releasing means operating alternately upon opposite ends of said levers prior to distributing the hooks for a change of shed to release the side edges of said hooks from frictional contact with the side walls of said groove.

2. A jack having a lever, hooks operatively connected with its opposite ends, a plurality of stationary stop-bars, and a device to remove said hooks from contact with said stop-bars that the hooks may fall when called for by the pattern-surface.

3. In a loom, a series of hooks and knives with which said hooks are engaged prior to the movement of the knives to move the hook for the formation of sheds, means for moving the hook longitudinally after the knives complete their inward stroke, to break the contact of the edges of the work with the edges of knives, and pattern-controlled mechanism to thereafter distribute the hooks with relation to the knives.

4. In a shed-forming mechanism for looms, a plurality of knives, kicker-rods connected with said knives, means for moving said knives and their kicker-rods, a plurality of notched jacks, a lever pivoted on each jack,

hooks pivoted to the opposite ends of said levers, means to effect the engagement and disengagement of said hooks with said knives, two rock-shafts, and a releasing device for
5 each rock-shaft, said kicker-rods moving said rock-shafts that said releasing device may act on one or the other end of said levers, substantially as and for the purpose described.

5. In a shed-forming mechanism for looms,
10 a plurality of knives, kicker-rods connected with said knives, means for moving said knives and their kicker-rods, a plurality of notched jacks, a lever pivoted on each jack, hooks pivoted to the opposite ends of said levers, means to effect the engagement and disengagement of said hooks with said knives,
15 two rock-shafts, provided with a releasing device and a lever, said kicker-rods moving said rock-shafts that said releasing device may
20 act on one or the other end of said levers, and

a spring connecting the ends of the levers attached to said rock-shafts.

6. A jack having a lever, hooks operatively connected with its opposite ends, a plurality of stationary stop-bars, a device to remove
25 said hooks from contact with said stop-bars that the hooks may fall when called for by the pattern-surface, said jack being notched at its opposite end portions and an intermediate device to which is adjustably attached
30 the harness connections leading from said jacks.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RANDOLPH CROMPTON.

Witnesses:

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