

No. 765,739.

PATENTED JULY 26, 1904.

H. F. KLINGELE.  
SHED FORMING MECHANISM FOR LOOMS.

APPLICATION FILED APR. 14, 1904.

NO MODEL.

2 SHEETS—SHEET 1.

FIG. 1.

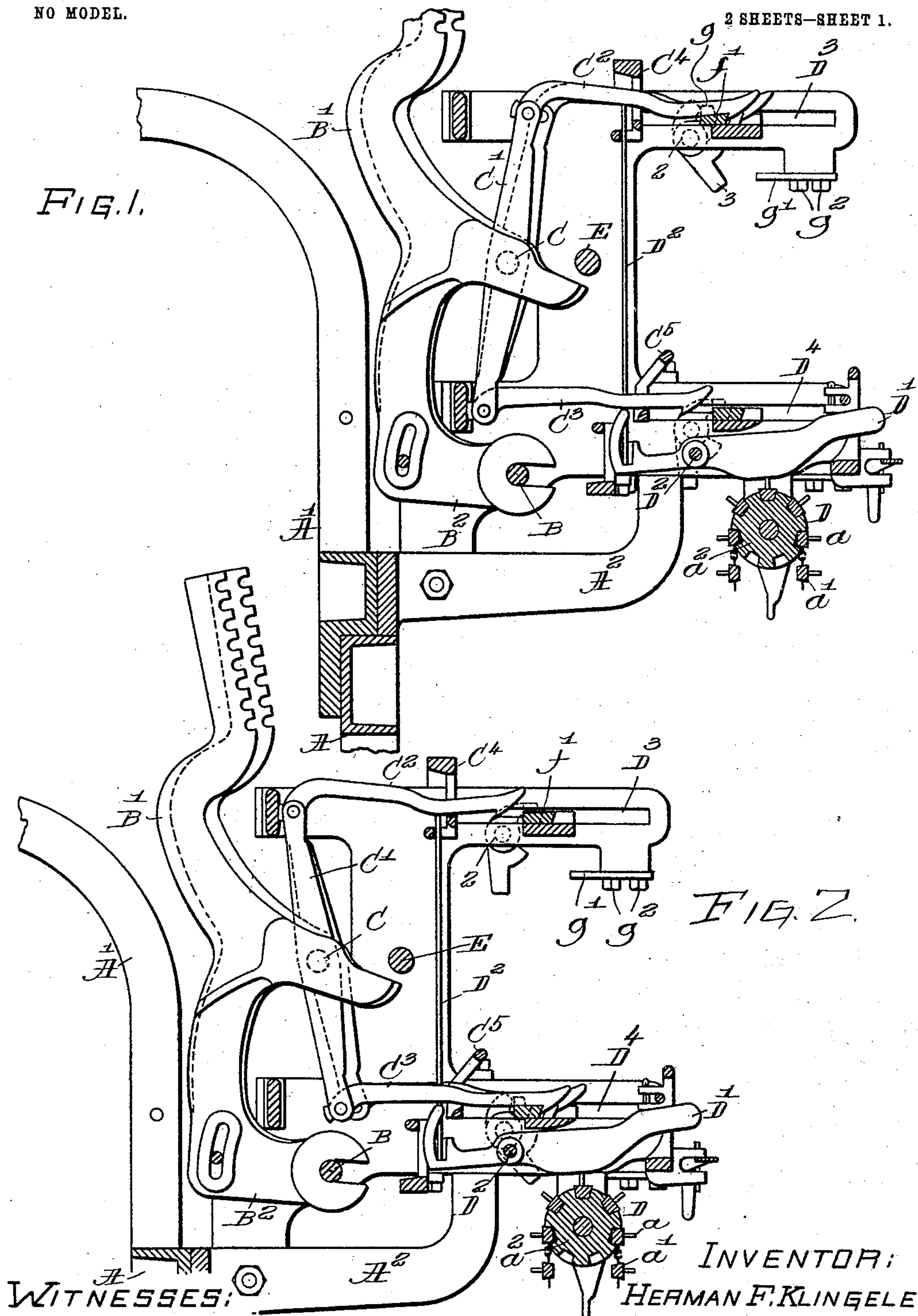


FIG. 2.

WITNESSES:

L. H. Homer.  
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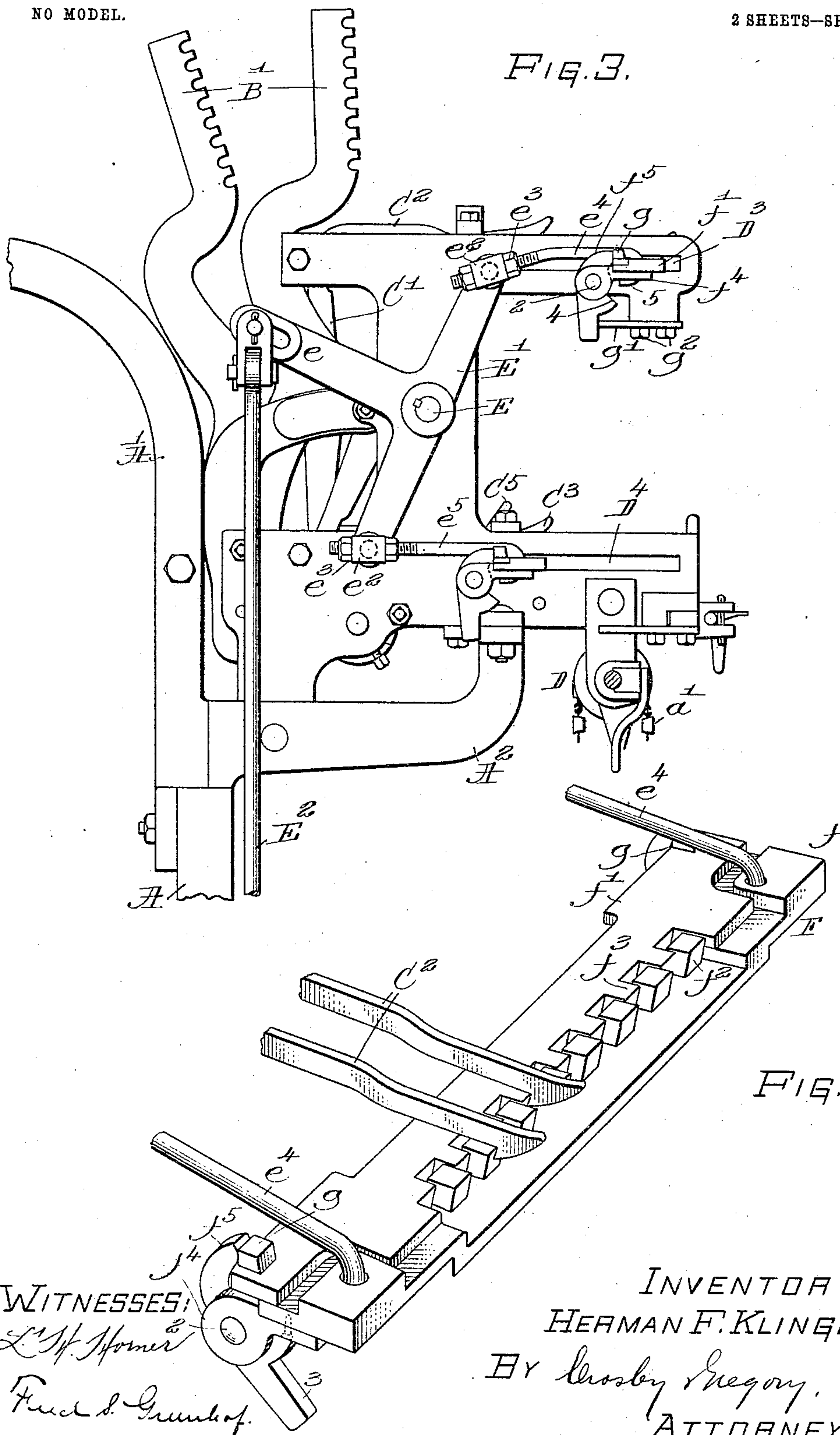
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L. H. Homer

Frederick L. Grunhof

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# UNITED STATES PATENT OFFICE.

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## SHED-FORMING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 765,739, dated July 26, 1904.

Application filed April 14, 1904. Serial No. 203,078. (No model.)

*To all whom it may concern:*

Be it known that I, HERMAN F. KLINGELE, a citizen of the United States, residing at 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 has for its object the production of novel shed-forming mechanism, whereby some of the harness-frames when opening a shed are moved in advance of others, such movement avoiding chafing of the warp ends in the formation of the shed.

I have herein chosen to illustrate my invention as applied to a loom wherein the shed-forming mechanism is of the class known as "double-acting dobby," in which a series of hooks jointed, respectively, to the upper and lower ends of connectors pivoted on jacks which are joined in usual manner to the harness-frames are selected from a pattern-surface, so that either the upper or lower hook extended from each connector will be engaged by one or the other of two horizontally-sliding actuators. In this class of loom as heretofore constructed the sliding actuators have been made as single bars tapered at one edge, and said bars have been slid horizontally in slots of the head-motion, and said bars have raised the harness-frames so that all the warps were moved in unison.

In accordance with my invention I have provided means whereby some of the warp ends may be lifted before the others are moved in advance of others in making each shed. To do this, I have devised a novel actuator comprising a plurality of slidable members, one movable on or with relation to the other, each member being adapted to engage some and not others of the hooks, so that one member of the actuator may engage some of the hooks and start the warp ends and at a later period the other member of the actuator will meet hooks and start the rest of the warp ends, such movement of the warp ends pre-

venting the rubbing together and chafing of the ends. By crossing the warp ends at different times during the completion of a shed the crowding of the warps together at the point of crossing is done away with. The warp ends may be moved in unison during the final movement of completing the shed preparatory to evening the warps in the upper plane of the shed.

Figure 1, in section and partial elevation, shows a dobby head-motion embodying my improvement; Fig. 2, a like view showing the actuators, however, in different positions. Fig. 3 is an elevation of the parts shown in Fig. 1, the upper member of the actuator being at the limit of its outward stroke. Fig. 4 is an enlarged detail showing one of the actuators detached.

In the drawings, A represents part of the end frame of a loom, A' part of the usual arch having sheaves to sustain the cording from which are suspended the harness-frames, said cording being connected with the harness-levers, to be described, and A<sup>2</sup> the framework of the dobby head-motion.

The framework A<sup>2</sup> has a rod B, that constitutes the fulcrum for a series of hooked jacks B', to which one end of the cording referred to is attached. Each jack has an arm B<sup>2</sup>, that receives the fulcrum C of a connector C', each connector having jointed to its ends a series of upper hooks C<sup>2</sup> and lower hooks C<sup>3</sup>. These hooks are extended through slots in guides C<sup>4</sup> and C<sup>5</sup>. The upper hooks are sustained by needles D, the lower ends of which rest in pockets of fingers D', pivoted at D<sup>2</sup> and moved at the desired time by indicators  $\alpha$  of a pattern-surface  $\alpha'$ , carried by a pattern-cylinder  $\alpha^2$ .

The head A<sup>2</sup> has guiding-slots D<sup>3</sup> D<sup>4</sup>. The head also sustains a rock-shaft E, having keyed to one end thereof outside of the head a three-armed lever E', the rearwardly-extended arm  $e$  of which has adjustably connected with it a rod E<sup>2</sup>, that in its reciprocations turns said lever and rock-shaft. The opposite end of the rock-shaft D has attached thereto a lever like the arm E', with the exception of its back-



wardly-extended portion  $e$ . The lever  $E'$  and the arm referred to connected with the shaft  $E$  receive at their opposite ends swivel-blocks  $e^2$ , in which is made adjustable by nuts  $e^3$  connecting-rods  $e^4$  and  $e^5$ .

The parts so far described are and may be all as commonly used in usual dobby-looms of the Hutchins, Wyman, or Stafford type, and need not be further herein described, as they are not of my invention.

My invention resides in the novel actuator, to be hereinafter described, whereby as the warp ends are crossed in going from one to the other plane of the open shed some of said ends are crossed in advance of others or at different times in the formation of the shed to prevent chafing of said warp ends.

The connecting-rods  $e^4$   $e^5$ , just alike, are each connected at their outer ends with the main member  $f$  of my improved actuator  $F$ , the other member,  $f'$ , coacting therewith being movable with relation to the member  $f$ . The member  $f$ , as shown, has a series of projections  $f^2$  rising therefrom, as represented in Fig. 4, and the member  $f'$  has a series of projections  $f^3$  occupying positions between the projections  $f^2$ . These two members when superimposed, as shown in the drawings, are slid longitudinally in the guideways  $D^3$   $D^4$  of the head-frame. The member  $f$  has secured to it by a suitable screw (shown in dotted lines, Fig. 4) or in any other usual manner ears  $f^4$ , having studs 2, that constitute the fulcrum for like buffers  $f^5$ , the upper ends of which are made to act at the proper time on projections  $g$  at the opposite ends of the member  $f'$  of the multipart actuator.

The knives or lower ends 3 of the buffers depend and as the actuators approach the completion of their outward stroke strike stops  $g'$ , shown as plates united to the head-motion by screws  $g^2$ . As each actuator approaches its inward position, as shown by the upper actuator in Fig. 1, the member  $f'$  occupies the position shown in the enlarged view in Fig. 4, the buffer at such time being turned into the position shown in Fig. 1 by the turning of the upper hooks thereon, said member turning the buffer until the shoulders 4 thereof of contact with the lump 5 (see Fig. 3) extended from the lower end of the ear  $f^4$ .

In Fig. 1 the upper actuator is supposed to be on its inward stroke, but has not yet completed its stroke, said actuator when at its inward stroke presenting its projections  $f^2$  and  $f^3$  out of contact with the hooks, so that the hooks may be disturbed through the action of the fingers  $D'$  and needles  $D$  that the actuator when it is started on its outward stroke may engage such hooks as are to be moved within the formation of the next shed. In this outward movement of the actuator, whether the upper or the lower end, the projections  $f^2$  stand in a line a little ahead of the projections  $f^3$ , and consequently the projections  $f^2$  en-

gage the hooks a little in advance of the projections  $f^3$  and start said hooks forwardly, causing the harness-frames controlled thereby to start and lift in advance of others some of the warp ends that are to be lifted in the formation of the shed now to be made. After the projections  $f^2$  have moved a short distance and taken with them some of the hooks of the series of hooks  $e^2$  the projections  $f^3$  meet the remaining hooks and take them up and move them forwardly with the projections  $f^2$ , one series of projections being a little behind the other, so that the warp ends are not crowded. The outward movement of the actuator is continued, say, from the position, Fig. 1, shown by the upper actuator until the depending end of the buffer meets the stop  $g'$ , as shown in Fig. 3, thus moving the buffer and causing it by its upper end in contact with the projection  $g$  to start forward at a faster speed the member  $f'$ , having the projections  $f^3$ , and by the time that the forward movement of the actuator is completed the projections  $f^2$  and  $f^3$  occupy a position in line, thus enabling all the warps raised in the upper plane of the shed to be leveled.

The lower actuator in Fig. 1 and the upper actuator in Fig. 2 are shown as disengaged from the hooks and with the faces of the projections in the same vertical plane.

Prior to my invention I am not aware that an actuator or knife for moving hooked jacks in the formation of sheds has ever been composed of a plurality of members having projections to engage individually with the shoulders of the hooks, the projections of said members acting one after the other upon the shoulders of the hooks to start some of the hooks forwardly in advance of the others, said members and their projections after having engaged the series of hooks being thereafter further moved in the opening of the shed and finally moving one series of projections with relation to the other series to substantially even the shed, and this feature I desire to claim, broadly, irrespective of the particular construction herein represented, as I intend to include in my invention any multipart actuator capable of operating in the formation of a shed to move some of the warp ends to occupy a position in one plane of the shed in advance of other warp ends to obviate chafing the warp ends as the warp ends cross at the center line of the shed.

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

1. In a loom, harness-levers adapted to be connected with harness-frames, hooked jacks operatively connected with said levers, and actuators comprising a plurality of members, each having a series of projections, the projections of one member standing between the projections of the other member, and means for sliding said members in the same direc-



tion to engage said hooks and move some of said harness-levers after starting other of said levers.

2. In a loom, a plurality of actuators comprising each a plurality of members made as bars, each having a plurality of projections, the projections of one bar standing between the projections of the other bar, and means for sliding said bars to engage said hooks at different intervals of time in their outward movement to thereby cause the warp ends to be crossed in the meeting line of the shed at different intervals of time in the formation of the shed.

3. In shed-forming mechanism for looms, harness-levers, hooked jacks operatively connected therewith and actuating means for said jacks, said actuating means presenting a plurality of series of projections, some of which are adapted to engage some of said hooked jacks, while other projections engage other of said hooked jacks, and means to cause some of said projections to engage and move some of said hooked jacks in advance of the engagement and moving of other of said hooked jacks.

4. In shed-forming mechanism for looms, a series of hooked jacks, an actuator for said jacks comprising a plurality of members having each a series of projections, means to start said members outwardly that the projections of one member may engage some of the hooks, and thereafter the projections of the other member engage the remaining hooks.

5. In shed-forming mechanism for looms, a series of hooked jacks, an actuator for said jacks comprising a plurality of members having each a series of projections, one member being movably sustained by the other member, means to start said members outwardly that the projections of one member may engage some of the hooks, and thereafter the projections of the other member engage the remaining hooks.

6. In shed-forming mechanism for looms, a hooked-jack actuator comprising a plurality of members each having a series of hook-engaging projections, one member being movably mounted on or with relation to the other

member, and means to move both said members in the same direction, and one member on the other member during the formation of a shed.

7. In shed-forming mechanism for looms, a hooked-jack actuator comprising a plurality of members, one movable with relation to the other, and means to move said actuator whereby one member will first engage a portion of the hooked jacks and the other engage the remaining hooked jacks at a later period of the outward movement of the actuator, and means to effect further movement of one member to bring all the hooked jacks in line to complete the shed.

8. In shed-forming mechanism for looms, a hooked-jack actuator comprising a plurality of members, each having a series of hook-engaging projections, and a bunter to act on one of said members near the completion of the outward movement of said actuator to cause the projections last to engage the hooked jacks in the outward movement of the actuator to be brought substantially into line with the projections first to act in the formation of a shed.

9. In shed-forming mechanism including harness-levers, adapted to be connected with harness-frames having usual heddles, and a series of hooked jacks attached to said harness-levers, mechanism to engage some of said hooked jacks in advance of the engagement of other jacks of the series, that the series of levers controlling the warp ends to be carried into either plane of the shed may be moved, some in advance of others, in order that some of the warp ends being moved into the opposite planes of the shed may cross each other at different times with relation to the width of the fabric being woven, thereby obviating chafing of said warp ends.

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

HERMAN F. KLINGELE.

Witnesses:

ROBT. C. DOUGLAS,  
CHARLES F. ALDRICH.