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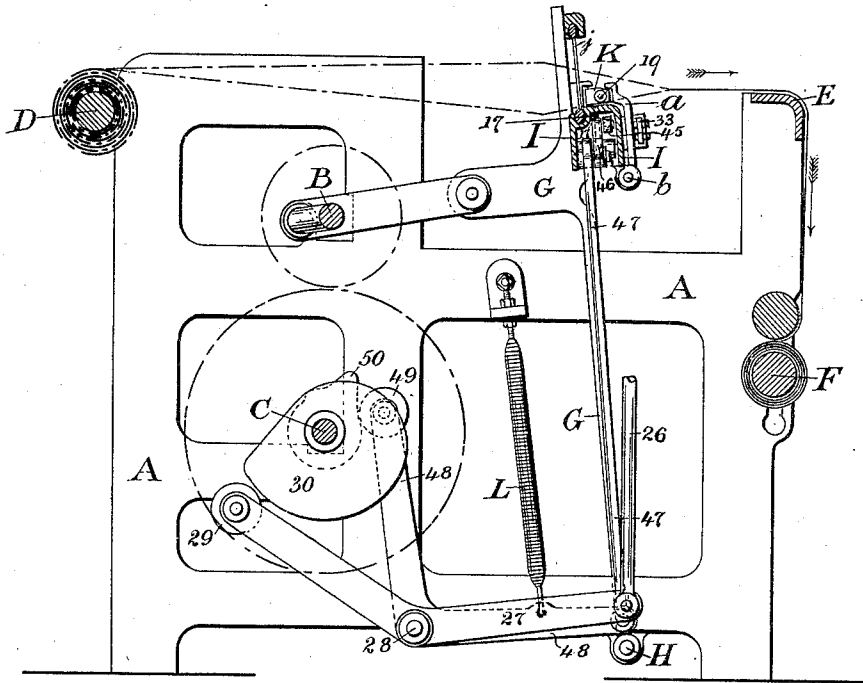
5 Sheets—Sheet 1.

H. HODGSON, C. BEDFORD & F. DRACUP.  
LOOM.

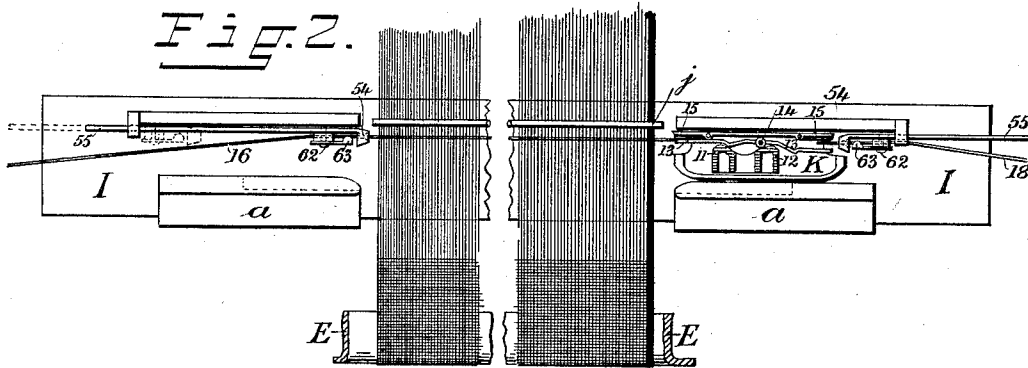
No. 432,046.

Patented July 15, 1890.

*Fig. 1.*



*Fig. 2.*



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(No Model.)

5 Sheets—Sheet 2.

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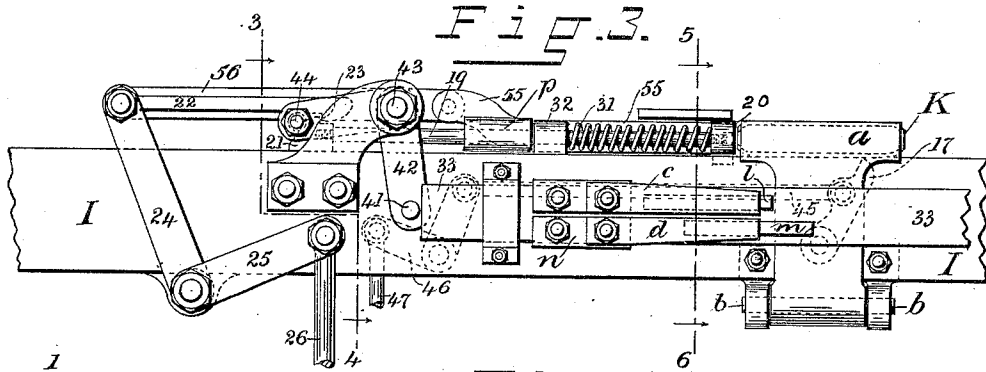


Fig. 4.

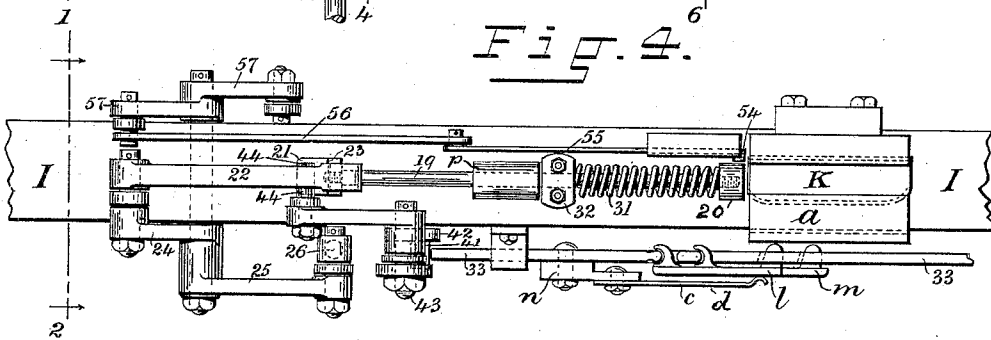


Fig. 5.

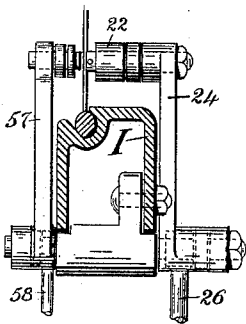


Fig. 6.

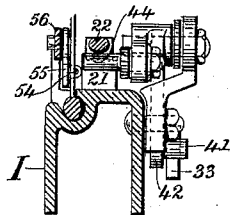


Fig. 7.

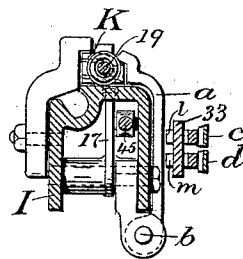
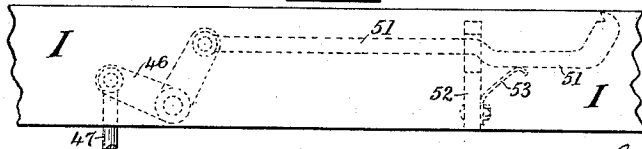


Fig. 8.



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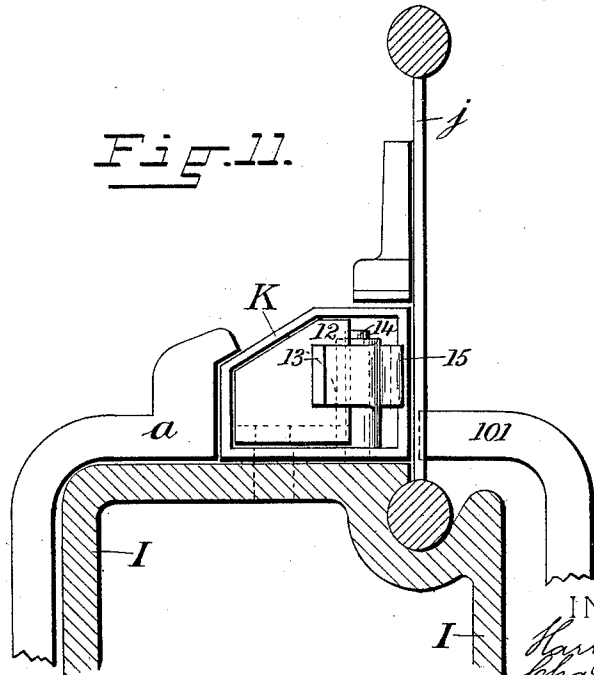
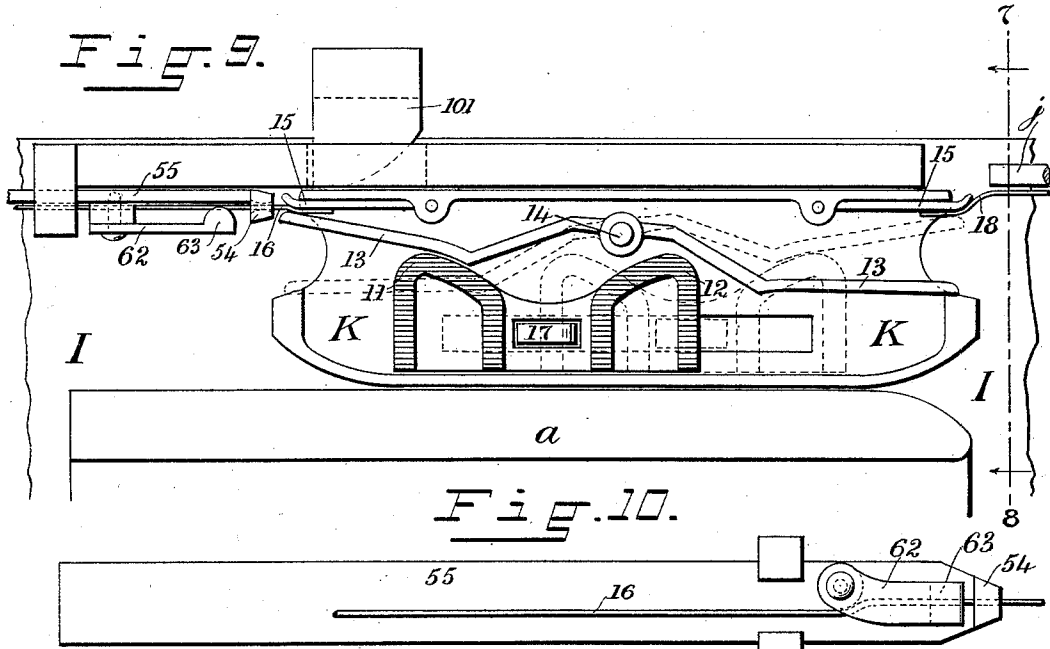
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LOOM.

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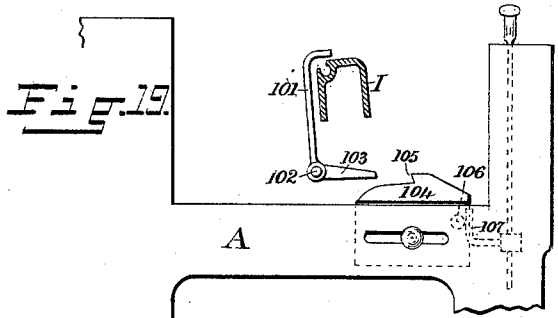
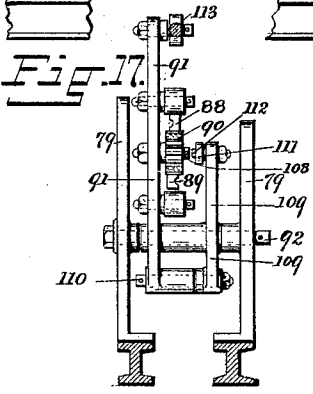
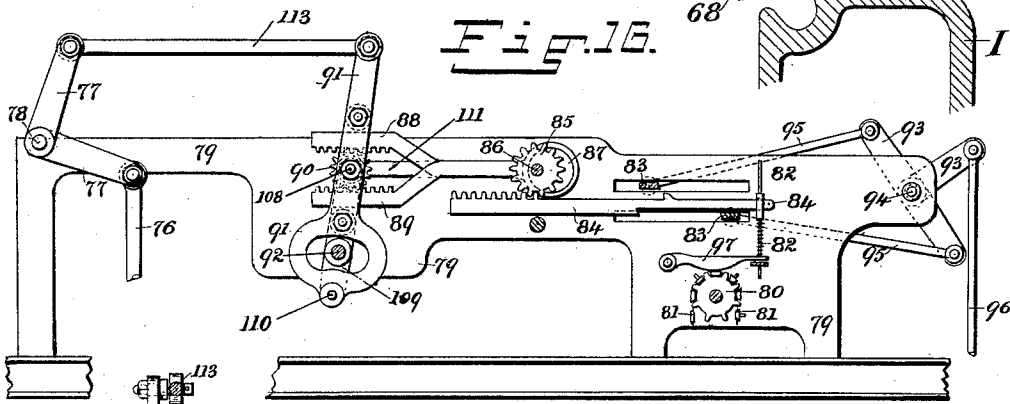
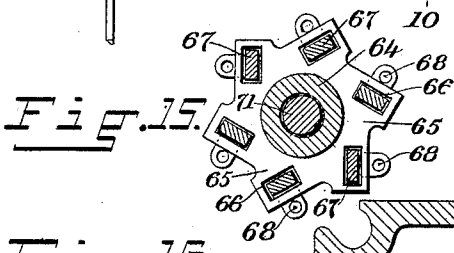
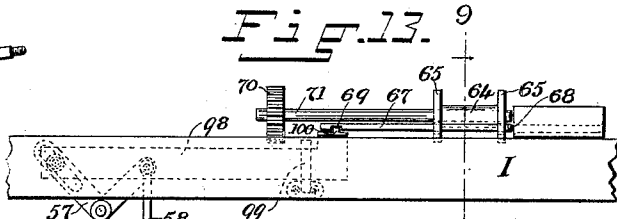
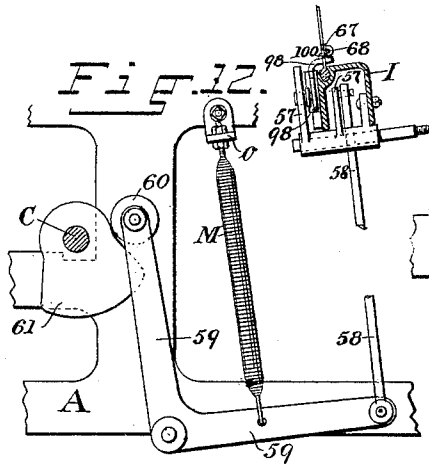
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LOOM.

No. 432,046.

Patented July 15, 1890.



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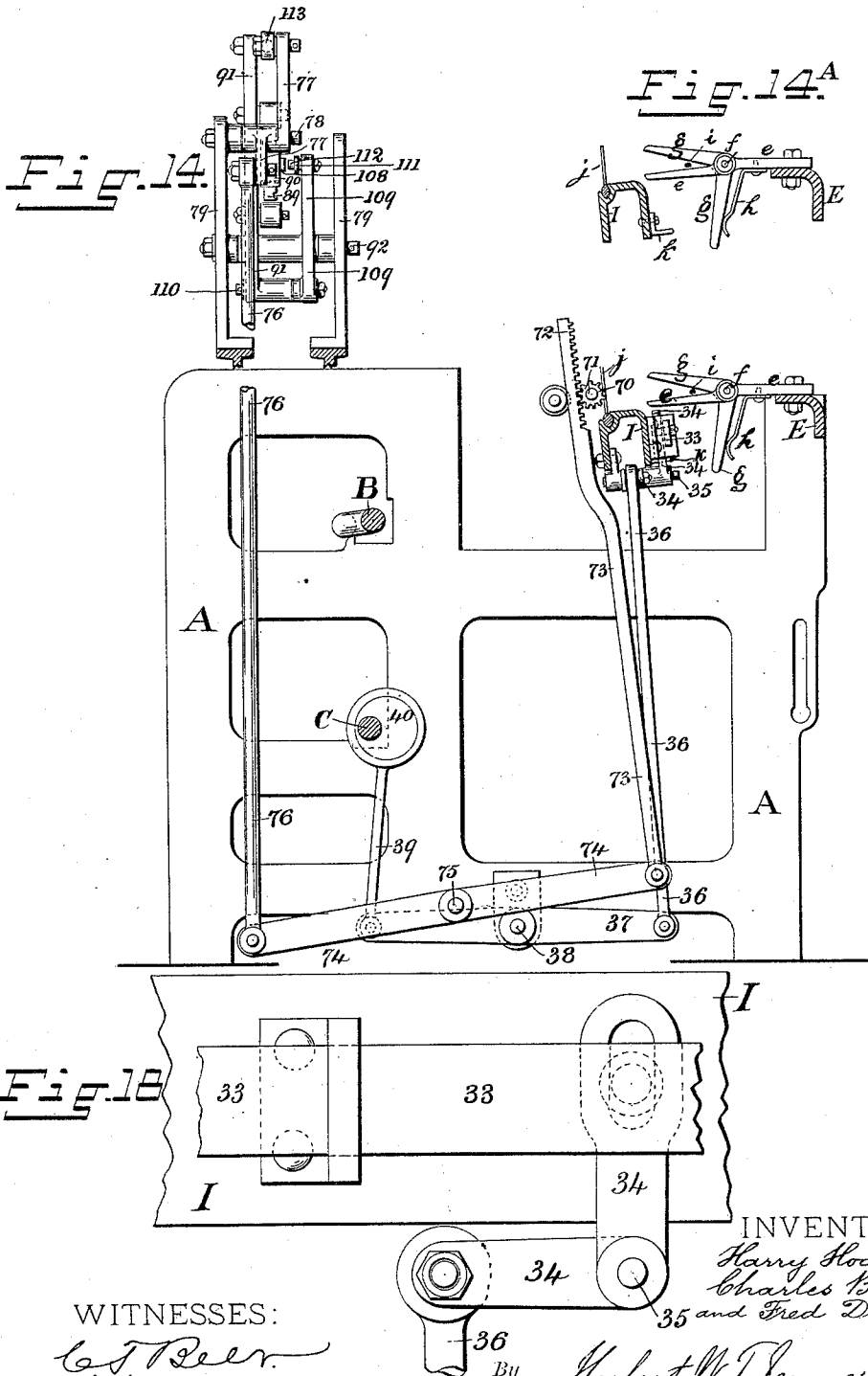
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# UNITED STATES PATENT OFFICE.

HARRY HODGSON, CHARLES BEDFORD, AND FRED DRACUP, OF SHIPLEY,  
COUNTY OF YORK, ENGLAND.

## LOOM.

SPECIFICATION forming part of Letters Patent No. 432,046, dated July 15, 1890.

Application filed February 24, 1890. Serial No. 341,471. (No model.)

*To all whom it may concern:*

Be it known that we, HARRY HODGSON, CHARLES BEDFORD, and FRED DRACUP, citizens of Great Britain, residing at Shipley, in the county of York, England, have invented certain new and useful Improvements in Looms; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to the mechanism for sending or carrying shoots of weft across the warp in looms for weaving, instead of the ordinary shuttle with its cop or bobbin, now used for that purpose.

The object of our invention is to provide mechanism for carrying shoots of weft across the warp without the presence of the cop or bobbin containing the weft in the shuttle, and to reduce the size of the shuttle so that a smaller shed can be formed and the tension on the warp reduced.

To this end our invention consists in the novel and peculiar arrangement, construction, and operation of the several parts of mechanism, all as hereinafter fully described.

In the accompanying drawings, illustrating our invention, Figure 1 is a section of a loom, showing the tappets and levers for operating the packing-rod 19 and the lever 17, the latter being for moving the double-cammed slide laterally in the weft-carrying instrument or shuttle, and for adjusting or placing the said weft-carrying instrument in its proper position. Fig. 2 is a plan of the sley-board 1 shown in Fig. 1, together with the weft-carriers, weft-guides, boxes, and connections for the weft. Fig. 3 is a part front elevation of the sley-board, and Fig. 4 is a plan thereof. Fig. 5 is a section taken on line 1 2 of Fig. 4. Fig. 6 is a section taken on line 3 4 of Fig. 3. Fig. 7 is a section taken on line 5 6 of Fig. 3. Fig. 8 is an elevation of the sley-board, showing modified means for moving the double-cammed slide 11 and 12 and adjusting the weft-carrying instrument in its box. Fig. 9 is an enlarged detail plan view of the instrument and jaws, holders, or grippers for holding the weft, showing more plainly the position of the lever 17, which passes through an

opening or slot in the weft-carrying instrument and enters an opening or slot made centrally in the double cam and slide 11 and 12 for acting thereon at the proper moment, so as to open and close the jaws, holders, or grippers and adjust the instrument. Fig. 10 is a front elevation of the weft holder and guide 55 and eyelet 54. Fig. 11 is a section taken on line 7 8 of Fig. 9. Fig. 12 is a section of the sley-board 1 and portion of the loom, showing the modification and arrangement of the weft holders and guides and the method and means of operating the same when weaving fancy goods and several wefts are employed, the weft holders and guides shown in the previous figures answering only when weaving plain fabrics, and the same weft is used throughout. Fig. 13 is a front elevation of a portion of the sley-board, showing the weft holders and guides and means for operating them. Fig. 14 is a section of the loom, showing the means for selecting and presenting the weft holder and guide carrying the weft which is to be woven into the fabric to form the required pattern opposite the "shed," and the means for severing the weft when it is beaten up against the last shoot of weft. Fig. 14<sup>A</sup> is a section also showing the apparatus for severing the weft when beaten up. Fig. 15 is an enlarged section, taken on line 9 10 in Fig. 13, of the weft holders and guides and their supports. Fig. 16 is a front elevation, and Fig. 17 an end elevation, of the jacquard or dobbie for selecting and determining the presentation of the weft holders and guides in position for the ends of weft to be seized by the grippers in the weft-carrying instrument. Fig. 18 is an enlarged elevation showing the levers for sliding the bar 33 endwise. Fig. 19 shows the ordinary stop-rod finger and parts for operating the shipper-rod for shipping the belt from the fast to the loose pulley to stop the loom when the weft-carrying instrument fails to enter the box at either end of the loom.

A represents the frame-work of the loom, B the crank-shaft, C the lower or tappet shaft, D the warp-beam, E the breast-beam, F the cloth or taking-up roller, G the sley or "going part" working upon a fulcrum H, all arranged in the ordinary manner. The sley-

board is shown at 1, which for the purpose of our invention is made hollow and preferably composed of metal. The shuttle or weft-carrying instrument is shown at K, and is of peculiar construction, being shown more plainly in plan view, Fig. 9. This shuttle is composed of a box or shell, within which is a loose part composed of two cams 11 and 12, the said cams being connected together by a web, in which web is formed a slot or opening for the purpose of allowing the double cam to be slid endwise within the said shuttle, as hereinafter explained. Within the said shuttle or weft-carrying instrument K is also a flat spring 13, hinged or working upon a fulcrum 14, fixed in the weft-carrying instrument. This flat spring 13, in conjunction with fingers 15 or with the back of the instrument, forms grippers gripping or seizing hold of the weft before the instrument is sent backward and forward across the loom. Fig. 9 shows the grippers to have hold of the weft-thread 16, and they are held in that position, so as to retain their hold of the weft, by means of the cam 11, which forces the left hand of the hinged gripper 13 against the stationary finger 15 at the left hand of the shuttle, whereby the end of the said weft is retained. After the weft-carrying instrument is sent across the loom, as hereinafter described, and enters the opposite shuttle-box, a hinged lever 17 enters the slot formed in the double cam 11 and 12, causing the double cam to advance within the shuttle, whereby the cam 11 releases its hold of the spring 13 and sets the shoot of weft 16 at liberty, and simultaneously with such sliding movement of the cam 11, the other cam 12 presses against the other end of the gripper-spring 13, as shown by dotted lines in Fig. 9, whereupon the weft 18 is seized hold of by the right-hand end of the gripper, immediately after which the shuttle is sent back across the loom, when the double cam is again slid as just explained, so as to cause the grippers to release their hold of one weft and take hold of the other weft, and this goes on so long as the loom proceeds to weave. *a* is the front of the shuttle-box, which the shuttle or weft-carrying instrument enters into on arriving at the end of the loom, the said box-front being hinged at *b* on a stud carried in a bracket bolted to the sley-board and caused to abut against the weft-carrying instrument by springs *c* and *d* (see Fig. 3) acting upon the "swells" *l* and *m*, attached to the sliding bar 33, with which they travel, by means of the bracket *n*. The spring *d* is a light one and is always pressing lightly on the box-front *a* through the medium of the swell *m*, the box-front *a* therefore pressing against the weft-carrying instrument K when it is in the box, and insuring a straight movement being given to the said instrument when it is being picked out of the box across the warp. The spring *c* is a much stronger one than spring *d*, and is so fixed on the sliding bar 33 that when

the instrument K is being picked out of the shuttle-box the swell *l* is not pressing against the box-front and forcing the latter against the instrument; but when the instrument is entering the box the endwise movement of the bar 33 places the swell *l* in position to act against the box-front *a* by means of the spring *c* for the purpose of checking the speed of the instrument on its entering the box and preventing it from forcibly striking against the picking-collar 20 or the end of the shuttle-box, thus avoiding any rebounding of the said instrument in the box. By the time the instrument or shuttle is to be picked back again, the rod 33 has been moved endwise to its former position, as shown in Figs. 3 and 4, and the swell *l* and spring *c* removed from contact with the box-front *a*, so that the said box-front shall not press forcibly against the instrument or shuttle when being picked. Similar springs and swells to those just described act in the same manner upon the box-front at the opposite or right-hand side of the loom, (not shown;) but it will be understood that the movement endwise in one direction of the bar 33, while withdrawing the swell *l* and spring *c* from the box-front *a* at the left-hand side of the loom, will place the corresponding spring and swell at the opposite or right-hand side of the loom in position to act and press against the box-front and check the instrument or shuttle which has just been picked from the left-hand box, and vice versa on the shuttle being picked back again.

The shuttle may be sent across the loom by the ordinary form of picking mechanism; but we propose to send the said shuttle across the loom by a new and improved method and means, consisting of a spindle or rod 19, (shown in Fig. 3,) the front or propelling end of which is provided with a boss or collar 20, such said rod 19 having fixed to it at the opposite end a lug 21, provided with a sneek, so that it may be slid back into position, after having picked the shuttle across the loom, by means of a hinged rod 22, the front end of which is made with a hook or sneek 23. The opposite end of such rod 22 is connected to the upper end of a bell-crank form of lever 24 and 25, connected to the upper end of an upright rod 26, attached to a lever 27, working upon a fulcrum 28, (see Fig. 1,) carrying a bowl 29, such said bowl being depressed by a cam 30, fixed to the tappet-shaft C. Thus when the said cam 30 revolves, the full part thereof depresses the bowl 29, causing the lever 27 to move on its fulcrum 28 and lift up the vertical rod 26, the effect of which is to draw lug 21 and rod 19 back into position for picking, as shown at Figs. 3 and 4, the shuttle, when it re-enters the box, and during the time the full part of the cam 30 presses on the bowl 29 the catch 23 (at the end of hinged rod 22) is lifted out of contact with the sneek in lug 21, whereupon the spiral spring 31, compressed between the collar 20 on the rod or shaft 19 and collar 32 fixed

firmly to the lay 1, is set free and forces the rod 19 and boss 20 endwise toward the shuttle-box, the collar 20 striking against the near end of the instrument K, (which is in contact with or close to said collar,) the force of the impact thereof being sufficient to send the instrument across the loom, carrying the weft with it. The motion of the rod 19 is arrested by the contact of the lug 21 with the leather boss or cushion *p*, mounted loosely on rod 19 and abutting against the fixed collar 32, which said cushion acts also as a stop-piece for preventing the rod 19 and collar 20 from moving farther than is necessary to give force to carry the shuttle across the loom.

The mechanism we employ for lifting the catch 23 out of contact with the lug 21 consists of the horizontal bar 33, (see Figs. 3, 4, 14, and 18,) receiving a reciprocatory rectilinear motion by means of a bell-crank form of lever 34, working upon a fulcrum 35, attached to a vertical rod 36, connected to one end of a lever 37, working upon a fulcrum 38, such said lever 37 being oscillated up and down by means of a rod 39 and eccentric 40, fixed upon the tappet-shaft C. The said sliding bar 33, in moving to the extent of its motion toward the left hand of Figs. 3 and 4, comes into contact with the pin 41, projecting from a bell-crank lever 42, working upon a fulcrum 43, the opposite end of which lever 42 carries a pin 44, resting against the under side of the hinged rod 22, with the result that the lever 42 is moved upon its fulcrum, causing the pin 44 to elevate the hinged rod 22 and lift the sneek 23 out of contact with the sneek in lug 21, which, as previously explained, allows the rod 19 to be sent forward by the spiral spring 31. It must be understood that similar mechanism to that just described is arranged at each end of the loom, but only one bar 33 is employed, and this bar extends across the loom from end to end.

Referring to a former part of this specification, where it was said that a lever 17 entered a slot made in the double-cammed slide 11 12 for the purpose of sliding the said double cam within the shuttle for operating the grippers, we will now describe the manner in which said lever 17 is operated, reference being had more particularly to enlarged details, Figs. 3 and 7, where it will be observed that the said lever 17 is connected to a rod 45, the opposite end of which is connected to one end of a bell-crank lever 46, attached to the vertical rod 47, whose lower end is connected to a bell-crank form of lever 48, carrying a bowl 49 in contact with a cam or tappet 50, fixed upon the tappet-shaft C, the said tappet and parts connected therewith being so timed and regulated as to cause the finger or lever 17 to enter and withdraw from the slot formed in the double cam 11 and 12, for the purpose of sliding the said double cam within the shuttle-box for operating the grippers, as previously described. Instead of the lever 17, operated as just described, we may employ a rod 51,

(see Fig. 8,) one end of which is bent upward and notched at its upper end. This rod 51 passes through a slot in a bracket 52, and is cranked at that point where it passes through the said slot, so that when the vertical rod 47 is made to descend the bell-crank lever 46 draws the cranked rod 51 endwise, withdrawing the cranked part out of the slot in the bracket 52, whereupon the flat spring 53 lifts the free end of the rod 51 upward, allowing it to enter the slot in the double cam 11 and 12, following which the endwise movement of rod 51 moves the double cam within the shuttle for the purpose of operating the grippers, as is the case with the short lever 17. The lever 17 and the rod 51 are brought back by the close spiral spring L (see Fig. 1) acting upon the lever 48.

Bobbins for supplying weft to the loom are placed at each side thereof, each end of the said weft being conducted to an eyelet 54, (see Figs. 2, 4, 9, and 10,) such eyelet being fixed to the end of a bar 55, connected to another link 56, the opposite end of which is attached to the upper end of lever 57. (Shown in Fig. 5.) This lever 57 is of bell-crank form, and is connected to a vertical rod 58, (see Fig. 12,) the latter being connected at its lower end to a bell-crank lever 59, carrying a bowl 60, operated by a cam 61, also fixed on the tappet-shaft C, the operation of which causes the eyelet 54 to advance toward the warp during the time the instrument is passing through the warp, the said eyelet 54 and parts connected therewith arriving at the position shown in full lines at the left-hand side of Fig. 2 before the instrument or shuttle has become settled in the box at the opposite or right-hand side of Fig. 2. The said weft is kept at a required tension between the eyelet and the instrument by means of a spring-finger 62, (shown more clearly at Figs. 9 and 10,) having an enlargement or projection 63, which nips the weft against the bar 55, which tension is maintained until the shoot of weft is beat up into the piece or fabric being woven, when the weft is severed at one end and released from the gripper at the other end of the shoot of weft. As soon as the weft is severed the weft-guide and its eyelet 54 return immediately to their former position, as shown by dotted lines at the left-hand side of Fig. 2, this being effected by the action of the close spiral spring M, attached to the bracket O and to the lever 59, (see Fig. 12,) acting upon the lever 59. Corresponding mechanism to that just described is placed at the opposite end of the loom, as shown at Fig. 2, and it is employed for the purpose of holding the end of the weft after being cut, ready to be nipped hold of by the grippers 13.

In order to cut or sever each shoot of weft sent across the loom, so as to leave a projecting end for the grippers 13 to seize hold of, we employ scissors or a cutting-instrument consisting of a blade *e*, Figs. 14 and 14<sup>A</sup>, fixed to the breast-beam E. There is also jointed

at *f* another blade *g*, forced open by a flat spring *h*, the arrangement being such that every time a shoot of weft *i* is sent across the loom and beaten up by the reed *j* such weft will come between the open blades *e* and *g* of the scissors, and that simultaneously there-  
 5 with a projection *k*, attached to the sley or going part of the loom, will strike the lower arm *g* of the scissors so as to close the scis-  
 10 sors, in doing which the weft is cut or severed, and on the sley going back the spring *h* opens the scissors ready to receive another shoot of weft, and this goes on as long as the loom continues to weave.

15 So far the specification and drawings have referred to a plain loom only, having a bobbin of weft at each end thereof of the same or a different color; but it is now our inten-  
 20 tion to show how our improved weft-carrying instrument or shuttle can be employed in connection with a loom containing a variety of wefts for the purpose of weaving fancy goods, and for this purpose we employ a bar-  
 25 rel 64, provided with flanges 65, (see enlarged views, Figs. 13 and 15,) in which are a number of slots or openings 66, through which pass bars or rods 67, carrying eyelets 68, with the accompanying springs 62, with their pro-  
 30 jections 63 (shown and described with reference to Figs. 2, 9, and 10) at one end thereof, and provided at their opposite ends with recesses 69. The rods 67 are employed instead of, but for the same purpose as, the rod or link  
 35 55, previously described—*i. e.*, for holding and guiding the weft-threads, which in this case may number two, three, four, five, or six, at each side of the loom, according to the pattern or design to be woven on the cloth. Each weft-thread is drawn from its respective bob-  
 40 bin and passed through the eyelet on the bar 67, corresponding to the bobbin containing the said weft, so that each bar carries its own individual weft throughout the weaving of the fabric. In order that any one of said bars  
 45 67 may be presented in position for permitting the end of weft which it is carrying to be nipped between the spring-gripper 13 and the back of the shuttle, a pinion 70 is mounted on the short shaft 71, carrying the barrel 64,  
 50 which said pinion gears into the teeth of the rack 72, (see Fig. 14,) formed at the upper end of the connecting-rod 73, whose lower end is connected to one end of the lever 74, working upon the stud 75 and having its opposite end  
 55 attached to the rod 76, the latter being connected to the bell-crank lever 77, working upon the stud 78, which is bolted to the framework 79, carrying the jacquard or dobby. (Shown in part sectional elevation at Fig. 16,  
 60 as seen from the left hand of Fig. 17, which is an end view thereof.) This shuttle-box motion consists of the ordinary pegging-cylinder 80, peg-lags 81, needles 82, reciprocatory cross-bars 83, double-hooked blades 84, having teeth  
 65 formed on the upper sides thereof, into which gear-pinions 85, mounted on shaft 86, carrying the eccentrics 87, which are connected to

the racks 88 and 89. Into these racks 88 and 89 gears the pinion 90, mounted on the stud 108, secured to the lever 91, working upon the stud 110, which is secured to the lever 109, piv-  
 70 oted on the stud or pin 92, secured in the framework 79. One end of a rod 111 is attached to the stud 112, carried by the upper end of the lever 109, the opposite end being connected to  
 75 one of the eccentrics 87, which receives motion by means of a pinion 85 when operated by a hooked rack 84 from the reciprocatory cross-bars 83. The said reciprocatory cross-bars 83 are operated by the lever 93, centered at 94  
 80 through the medium of the connecting-links 95, the T-lever 93 being operated by rod 96 from tappets or cams on the lower shaft C or crank-shaft B of the loom in the same man-  
 85 ner as in the present and well-known looms for weaving. The presence or absence of pegs in the peg-lags 81, when presented under the levers 97, determines whether the said levers shall be raised or allowed to remain in their  
 90 normal position; but if one of the same is raised the loose end thereof elevates the corresponding needle 82 and places its blade 84 so that the hook on its upper side shall engage with the upper reciprocatory cross-bar 83 on its return movement and be drawn end-  
 95 wise therewith, whereby the corresponding pinion 85 will be rotated, and by means of the eccentrics 87 and one of the racks 88 and 89 or rod 111 the lever 91 will be moved to the left or right, so as to elevate or depress the  
 100 rod 76, which transmits the motion thus given through the lever 74 to the rod 73 and rack 72 thereon, thereby rotating the pinion 70 and shaft 71 and the barrel 64, and presenting the rod opposite the shuttle-box holding and guid-  
 105 ing the weft which has been determined upon by the peg-lags, as described. The arrangement of the parts for operating the barrel 64 is such that the said barrel may be rotated one-sixth of a revolution, so as to present the next succeeding weft-holder 67 and its guide  
 110 68 in position for the grippers to seize hold of the weft it carries, or to rotate the said barrel one-third of a revolution or the extent of two bars 67, so as to present the next bar but  
 115 one in position, or to rotate the said barrel to any greater extent desirable, and this is accomplished as follows:

The bar 111 and racks 88 and 89 are operated separately by the bars 83 and their corre-  
 120 sponding eccentrics 87, pinions 85, hooked bars 84, needles 82, and peg-levers 97, which are in triplicate, one set only being seen in the drawings. When the rod 111 is operated by the eccentric 87, it moves the lever 109 upon the stud 92 as a fulcrum, upon which it turns, and imparts motion to the lever 91, (connected to lever 109 by stud 110,) causing the said lever 91 to turn upon the stud 108 as its fulcrum, and thereby giving, through the rod 113 and bell-crank lever 77, a movement to the rod 76 sufficient to rotate the barrel 64 and its disks 65 one-sixth of a revolution, or far enough to bring the next succeeding bar 67 into proper

position for presenting the end of the weft it carries to the grippers, and in like manner, when the racks 88 or 89 are operated by their respective eccentrics 87, the lever 91 is moved upon the stud 110 as its fulcrum, and through the parts 113 and 77 gives a movement to the rod 76 sufficient to rotate the barrel 64 and its disks one-third of a revolution, or far enough to bring the next bar but one into position for the grippers to seize hold of the weft it carries. By having three sets of eccentrics 87, pinions 85, hooked rods 84, needles 82, and peg-levers 97, any of the bars or weft-holders 67 may thus be brought into position for presenting the ends of weft to the grippers in the shuttle or weft-carrying instrument in such order as may be predetermined by the disposal of the pegs in the peg-lags 81 for the weaving of the desired pattern or figure on the cloth. The bar or rod 67, with its eyelet 68, at the moment it is presented opposite the shuttle-box is in the proper position for the end of weft projecting through the eyelet 68 to be seized between the back of the weft-carrying instrument and the near end of the spring-grippers 13 and gripped therebetween, when the said end of spring-grippers 13 closes upon the back of the instrument, as previously described, whereupon the weft-carrier or shuttle, now having hold of the end of weft issuing from the eyelet 68, is picked or sent across the loom, thus laying a shoot of weft across the warp, the weft-guiding bar or rod 67, with its eyelet 68, being instantly moved endwise toward the warp by a modified arrangement, corresponding to that shown and described, for effecting a like purpose when weaving a plain fabric, such modification consisting of a bar 98, arranged to slide in a bracket 99 at the back of the sley-board 1, one end of which said bar is bent over onto the top of the sley-board (see Fig. 12) and carries on its upper side a nipple or projection 100, corresponding to and arranged to enter into the recess 69 at the end of each of the bars 67. When the bar 67 is brought opposite the shuttle-box, as shown in Fig. 13, the recess 69 thereof is over the nipple or projection 100, which enters the said recess, so that when the bar 98 is slid endwise to the right by the bell-crank form of lever 57 the bar 67 is likewise slid endwise, whereby the eyelet 68 at the end of said rod is advanced as near to the outer threads of the warp as will allow a short end of the weft to project from the eyelet and through the outer threads of warp after the weft has been cut or severed by the scissors or knife. The bell-crank form of lever 57 is operated by cam 61 on tappet-shaft C acting upon bowl 60, attached to lever 59, which transmits motion, by means of the connecting-rod 58 to the lever 57 in the same manner as set forth in the description of our improvements when applied to a loom for weaving plain cloths. The bar 67 is brought back again by the close spiral spring M, acting on lever 59, as previously described.

In the enlarged section shown in Fig. 15,

which is taken on line 9 10 of Fig. 13, the flanges are more clearly shown, as are also the slots 66, bars 67, and eyelets 68.

In order to stop the loom when the weft-carrying instrument or shuttle does not enter the box *a*, we adopt the same mechanism as is used in the present construction of looms for the same purpose, such mechanism being shown at Fig. 19, where 101 is the stop-rod finger pivoted at 102, and carrying the finger 103 for engaging with the "frog" 104. Should the weft-carrying instrument fail to enter the box, the stop-rod finger 101 would assume the position shown in Fig. 19, the extremity of finger 103 being lowered, so that on the forward movement of the sley the finger 103 would strike against the part 105 of the frog and force such frog toward the front of the loom, causing the stud 106 to strike the bent rod 107, which moves the shipper-bar and transfers the driving-strap from the fast to the loose pulley. When the weft-carrying instrument enters the box, the stop-rod finger is forced outward from the sley-board, so as to raise the finger 103 clear of the frog, which would not therefore be operated. The stop-rod finger 101 is also shown in plan view, Fig. 9, and section, Fig. 11.

By employing a weft-carrying instrument, as herein described, we dispense with the weft-cop or bobbin now employed in shuttles, by reason of which the size of the weft-carrying instrument, especially the depth thereof, is reduced, allowing the size of the shed to be likewise reduced, with the result that the tension on the warp is lessened, this being a feature of much importance in the working of the loom and the goods produced, as will be well understood by those conversant with the trade. In addition to the above the sweep or movement of the going part can be lessened while the weft can be pieced up without stopping the loom, whereby a saving of time is effected.

We claim as our invention—

1. The combination, with a shuttle-body provided with a stud 14, of the flat spring 13 and the double-cammed slide 11 12, movable endwise in the shuttle-body, substantially as described.

2. The combination, with the shuttle-body having the fingers 15 and the stud 14, of the flat spring 13 and the double-cammed slide 11 12, movable endwise in the shuttle-body, substantially as described.

3. The combination, with a shuttle-body, a pivoted gripper-bar mounted therein, and a double-cammed slide movable endwise in the shuttle-body, of means for moving the said slide in the shuttle-body, substantially as described.

4. The combination, with a shuttle-body, a pivoted gripper-bar mounted therein, and a double-cammed slide movable endwise in the shuttle-body, of a slide-actuator movable so as to engage the slide, and means for causing the said actuator to engage the slide and

change its position relatively to the gripper-bar, substantially as described.

5. The combination, with a shuttle-body, a pivoted gripper-bar mounted therein, and a double-cammed slide movable endwise in the shuttle-body, of the sley, a slide-actuator, a bell-crank lever pivoted on the sley and to which the said actuator is connected, and means for vibrating the said lever, all substantially as described.

6. The combination, with the sley and the pivoted box-front *a*, of the reciprocating bar 33, the swells *l m*, the latter of which acts continuously against the box-front, and the former of which acts intermittently against the box-front, and the springs *c d*, substantially as described.

7. The combination, with the sley, of the box-front *a*, pivoted thereto, the bar 33, means for reciprocating the same, the swells *l m*, the latter of which rests continuously against the box-front while the former acts intermittently against the box-front, the weak spring *d*, resting against the swell *m*, and the strong spring *c*, acting against the swell *l*, substantially as described.

8. The combination, with the shuttle or weft-carrying instrument K, having the flat gripper-spring 13 and the double-cammed slide 11 12, and means for moving the said slide, of the weft holder or guide 55, the eyelet 54, and the flat spring 62, secured to the weft-holder 55 and provided with the enlargement 63 for nipping the weft against the bar 55, substantially as described.

9. The combination, with the rod 19, having the collar 20 and the lug 21, formed with a sneck, of the fixed collar 32, the spiral spring 31 between the collars 20 and 32, the rod 22, having a catch for engagement with the sneck on the lug 21, means for reciprocating the said rod 22, the lever 42, carrying a pin 44 for lifting the rod 22, and means for moving the said lever 42, substantially as described.

10. In looms, the combination, with the shuttle K, of the spindle or rod 19, provided with the collar 20, the leather collar or cushion *p*, and the lug 21, having a sneck thereon, the fixed collar 32, and a spiral spring 31, intermediate of the collar 20 and the fixed collar 32, the hinged rod 22, having a catch 23,

which engages with the sneck on the lug 21 on the backward movement of the said rod 22, and draws the rod 19 and the collar 20 away from the shuttle K, and compresses the spring 31, the bell-crank lever 24 25, the rod 26, the lever 27, and the cam 30 for reciprocating the hinged rod 22, the studs 41 and 44, the lever 42, and the reciprocatory bar 33 for engaging with the stud 41 to move the lever 42 on its fulcrum and elevate the stud 44, substantially as described.

11. In looms for weaving fancy goods, the combination of the barrel 64, mounted on the short shaft 71 and provided with disks 65, having slots or openings 66 therein, the weft holders or guides 67, passing through and supported in the slots 66 and provided with eyelets, the flat springs 62, having enlargements 63 thereon and recesses 69, the reciprocatory bar 98, provided with the projection or nipple 100 for entering the recesses 69, the pinion 70, the rack 72, gearing into the said pinion, the connecting-rod 73, the lever 74, the rod 76, the lever 77, and the jacquard or dobbie mechanism for shifting the position of the lever 77 according to the pattern to be woven, substantially as herein fully described.

12. In looms for weaving fancy goods, the combination of the mechanism consisting of the peg-lags 81, the pegging-levers 97, the needles 82, the reciprocatory cross-bars 83, the hooked racks 84, the pinions 85, gearing therewith, the eccentrics 87, the bar 111, the racks 88 and 89, connected with their corresponding eccentrics 87, the pinion 90, the levers 91 and 109, the rod 113, the lever 77, the barrel 64, a series of weft-holders carried thereby, and intermediate devices for communicating movement from the said lever 77 to the said barrel, substantially as herein fully described.

In testimony whereof we affix our signatures in presence of two witnesses.

HARRY HODGSON.  
CHARLES BEDFORD.  
FRED DRACUP.

Witnesses:

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