

No. 631,233.

Patented Aug. 15, 1899.

T. M. SOUTHWELL & T. W. HEAD.
LOOM FOR WEAVING TUFTED FABRICS.

(Application filed May 27, 1898.)

(No Model.)

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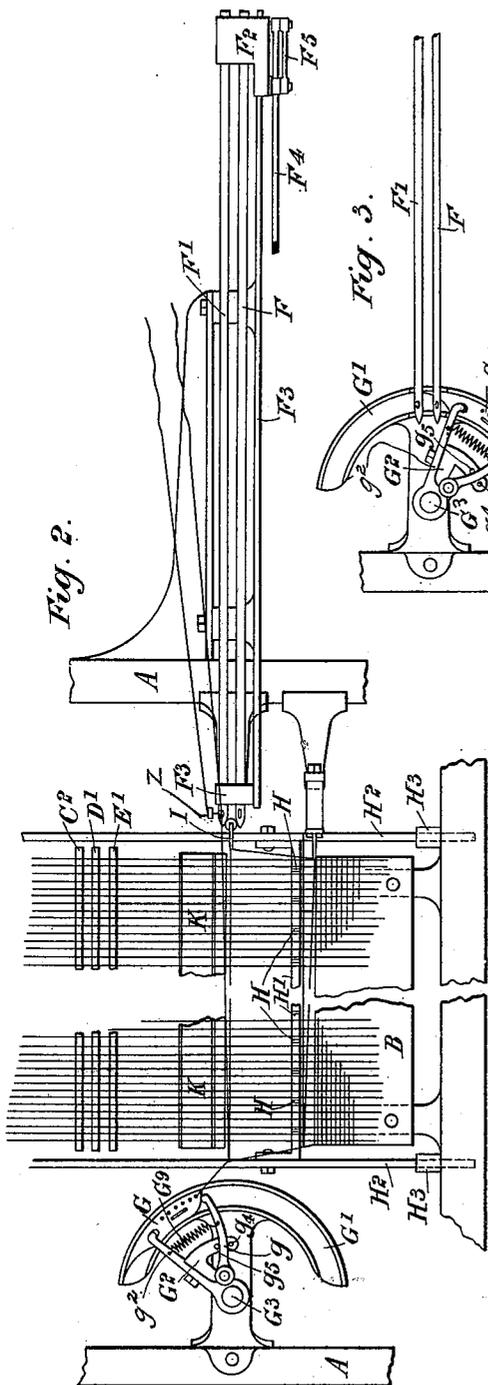


Fig. 2.

Fig. 3.

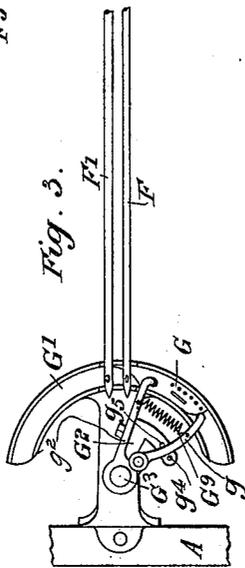
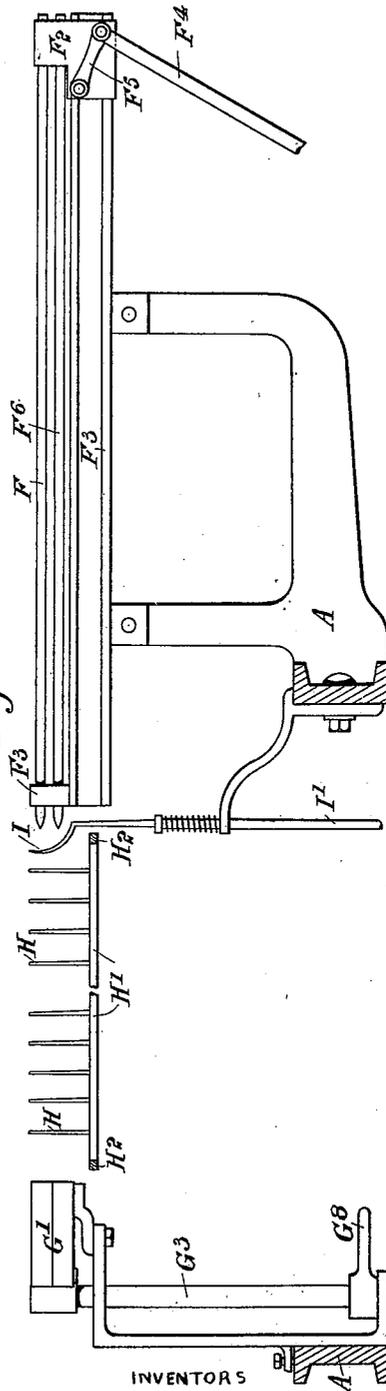


Fig. 6.



WITNESSES:
A. W. Wright.
S. C. Connor

INVENTORS
THOMAS MARTIN SOUTHWELL
THOMAS WILLIAM HEAD
BY *Horner & Horner,*
THEIR ATTORNEYS.

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Fig. 4.

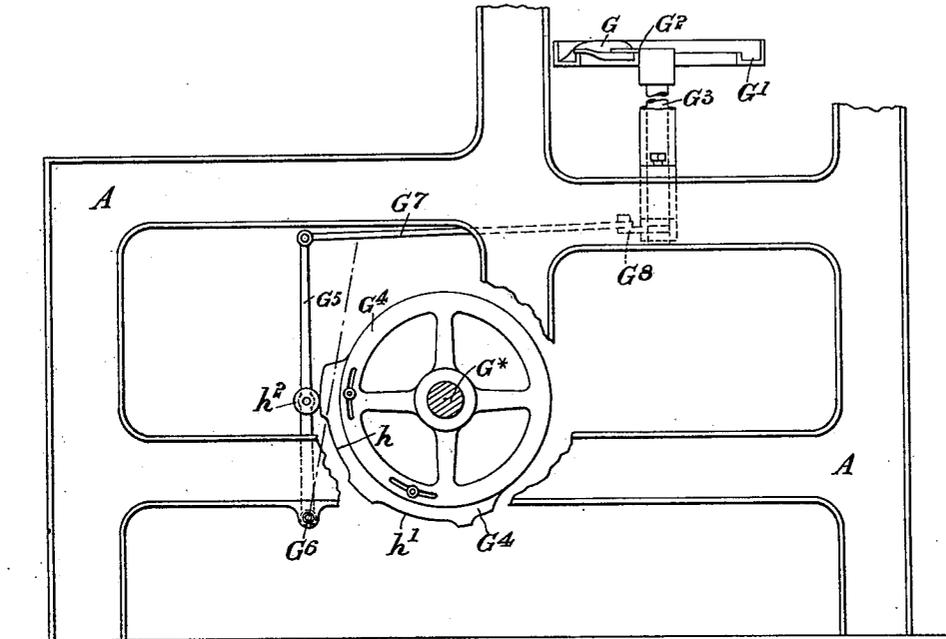
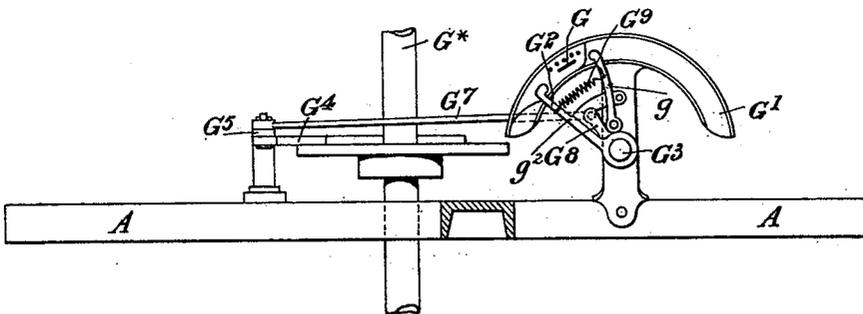


Fig. 5.



WITNESSES:

D. W. Wright
A. C. Connor

INVENTORS

THOMAS MARTIN SOUTHWELL

THOMAS WILLIAM HEAD.

BY *Harrison & Harrison*

THEIR ATTORNEYS.

No. 631,233.

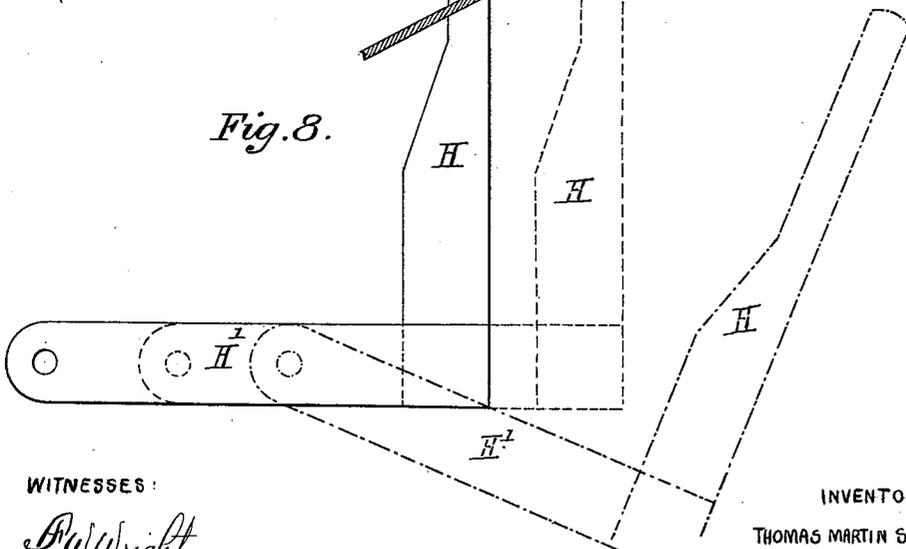
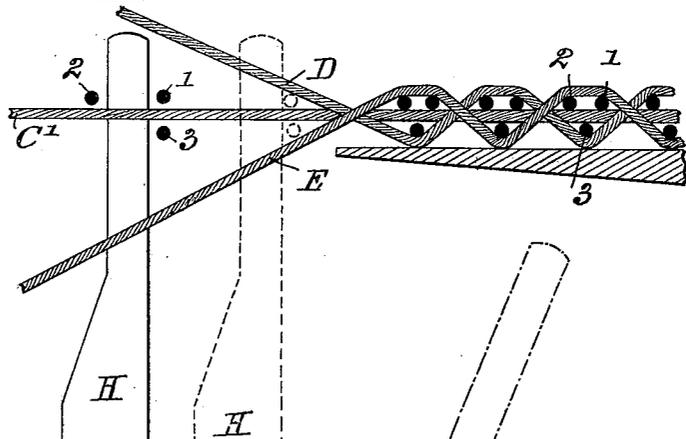
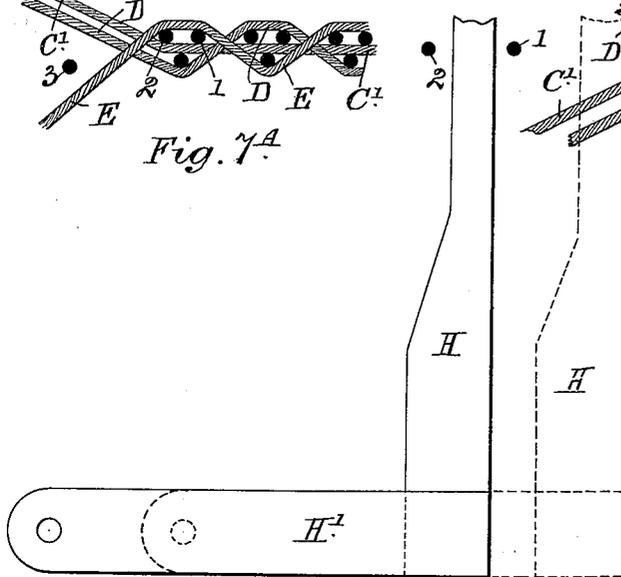
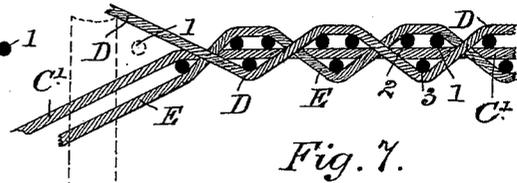
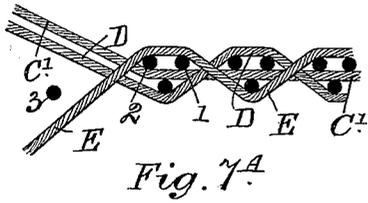
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6 Sheets—Sheet 4.



WITNESSES:

D. W. Wright
S. C. Connor

INVENTORS

THOMAS MARTIN SOUTHWELL
THOMAS WILLIAM HEAD

BY *Horsman & Horsman*

THEIR ATTORNEYS.

No. 631,233.

Patented Aug. 15, 1899.

T. M. SOUTHWELL & T. W. HEAD.
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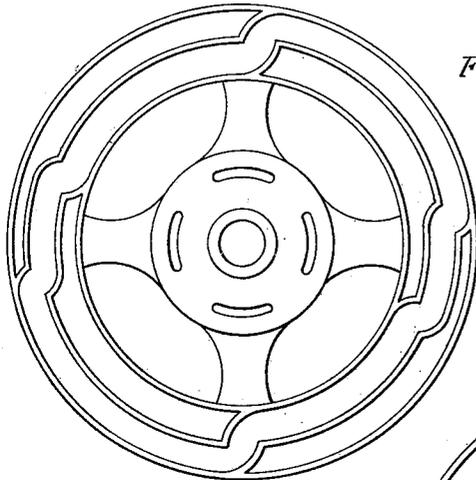


Fig. 9.

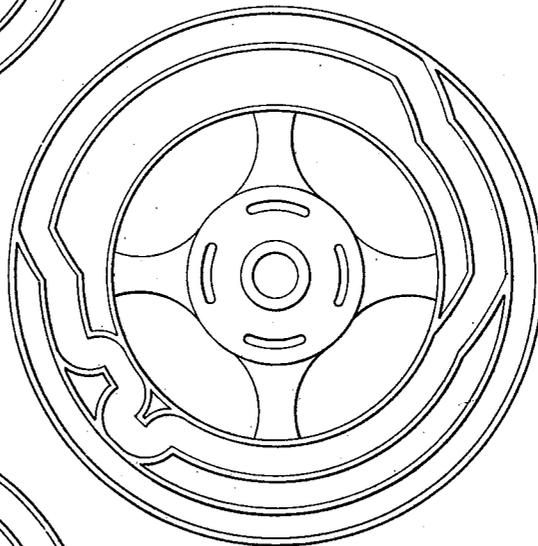


Fig. 11.

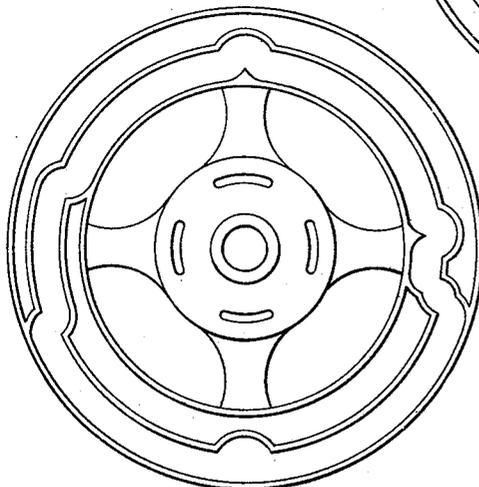


Fig. 10.

WITNESSES:

F. W. Wright
A. C. Connor

INVENTORS

THOMAS MARTIN SOUTHWELL

THOMAS WILLIAM HEAD

BY *Henson & Henson,*

THE ATTORNEYS.

No. 631,233.

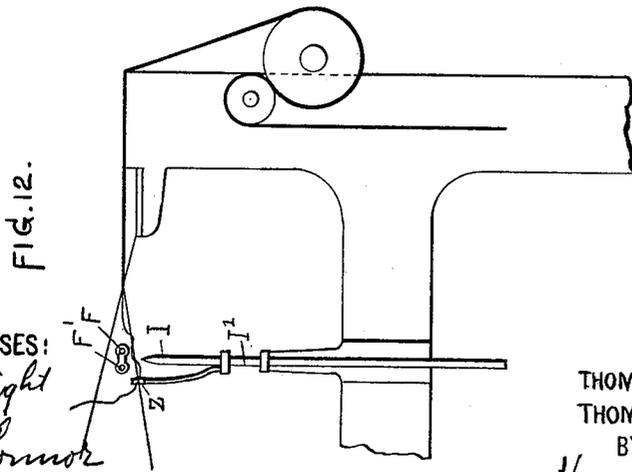
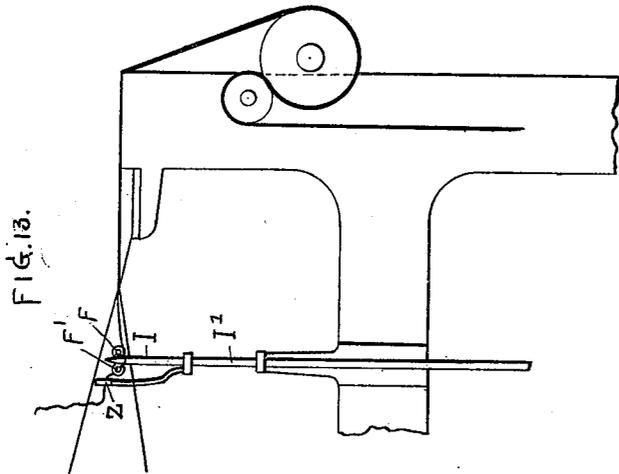
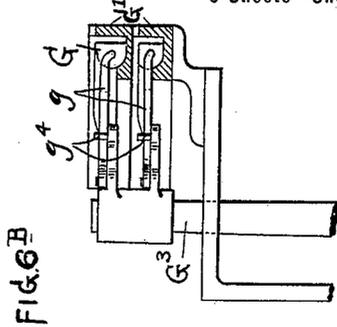
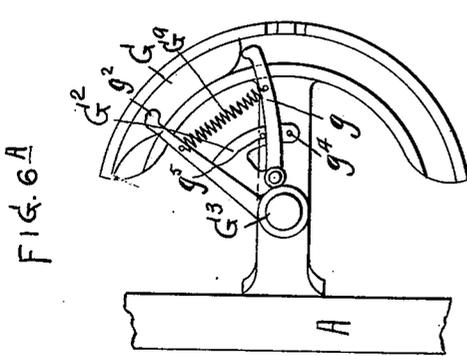
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(No Model.)

6 Sheets—Sheet 6.



WITNESSES:
G. W. Wright
A. C. Connor

INVENTORS,
 THOMAS MARTIN SOUTHWELL
 THOMAS WILLIAM HEAD
 BY
Howson and Howson
 HIS ATTORNEYS.

UNITED STATES PATENT OFFICE.

THOMAS MARTIN SOUTHWELL AND THOMAS W. HEAD, OF BRIDGENORTH,
ENGLAND.

LOOM FOR WEAVING TUFTED FABRICS.

SPECIFICATION forming part of Letters Patent No. 631,233, dated August 15, 1899.

Application filed May 27, 1898. Serial No. 681,934. (No model.)

To all whom it may concern:

Be it known that we, THOMAS MARTIN SOUTHWELL, manufacturer, and THOMAS WILLIAM HEAD, loom-tuner, subjects of the Queen of Great Britain and Ireland, and residents of Bridgenorth, in the county of Salop, England, have invented certain new and useful Improvements in Looms for Weaving Tufted Fabrics, (for which we have applied for a patent in Great Britain, No. 25,728, November 5, 1897,) which improvements are fully set forth in the following specification.

This invention relates to looms for weaving moquette carpets or other tufted fabrics, and has for its object to effect the weaving with greater rapidity than heretofore and to produce an improved selvage on such fabrics.

According to this invention weft-carriers are provided in combination with means for forming single sheds or double sheds and for simultaneously inserting two wefts in a single shed or for simultaneously inserting in a double shed two wefts in one of the sheds and one weft in the other of the sheds. A shuttle is provided with the single-shed arrangement for locking the weft-threads, two such shuttles being provided in the double-shed arrangement for locking the three simultaneously-inserted wefts and for forming the selvage on the fabric, improved shuttle-drivers being provided, which are capable of yielding so as to prevent too much cord from being drawn from the shuttles and so produce a firm and even selvage. One of the simultaneously-inserted weft-threads in both the single-shed and double-shed arrangements is retained in the open portion of the shed while the other weft-thread or other weft-threads is or are beaten up and while a row of tufts is being inserted, after which the retained weft is released and beaten up to bind the tufts.

The invention will be understood by the following description, with reference to the accompanying drawings, of which—

Figure 1 represents in transverse section, and Fig. 2 in plan, so much of a tuft-loom as is necessary to illustrate the arrangement for simultaneously inserting two wefts in a single shed, the improved shuttle-driver being shown in plan in Fig. 2, the shuttle having passed

through the loops of the weft-threads to lock them in and form the selvage on the fabric. Fig. 3 shows in plan the shuttle and shuttle-driver, the shuttle being shown as entering the loops in the two simultaneously-inserted wefts. Fig. 4 shows in elevation, and Fig. 5 in plan, the cam or tappet and mechanism connected therewith for operating the shuttle-driver. Fig. 6 is an elevation of the arrangement for simultaneously inserting three wefts in a double shed, two of the said wefts being inserted in one of the sheds and one weft in the other shed. Fig. 6^A is a plan view of the double shuttle and shuttle-driver, drawn to a larger scale; and Fig. 6^B is a vertical section of the same. Figs. 7 and 7^A show, on an enlarged scale, the formation of the weave by the single-shed arrangement; and Fig. 8 is a view showing the weave produced by the double-shed arrangement. Figs. 9 and 10 are face views of the cams which operate the heddles in the single-shed arrangement, Fig. 9 being the cam for operating the dead-warp heddle and Fig. 10 one of the duplicate cams for operating the heddles of the binding-warps. Fig. 11 is a face view of one of the duplicate cams for operating the heddles of the binding-warps in the double-shed arrangement, in which arrangement a dead-warp cam is not required, as the dead-warp always remains in the central position. Figs. 12 and 13 are detached views of a detail, showing a moving part in its two different positions.

The tuft-spools, tuft-spool carriers, and the mechanism for operating them and for inserting and separating the tufts are omitted from the drawings, as they form no part of the present invention; neither has it been considered necessary to show the cams for working the lay and other parts of the loom common to this class of loom and which are well understood by those acquainted with the art, it being understood that the several cams and operating parts are suitably timed to effect the several movements in their sequential order, hereinafter described.

With reference to the single-shed arrangement, (illustrated by Figs. 1, 2, 7, and 7^A,) A represents portions of the frame of the loom; B, the breast-beam; C, the warp-beams; C',

the dead or filling warp, and D E are the binding-warps.

C² is the heddle for operating the dead or filling warp, which heddle is actuated by the cam shown in Fig. 9.

D' E' are the heddles for operating the binding-warps D and E, which heddles are operated by cams, one of which is illustrated by Fig. 10.

F F' are the weft inserters or needles mounted in a carrier F², fitted to slide to and fro in or on guides F³, projecting from the frame A of the loom, this carrier being operated by a cam (not shown) through a rod F⁴ and link F⁵.

G is a shuttle by which a cord is inserted in loops of the weft-threads for securing them in the fabric and forming the selvage.

G' is the shuttle-race; G², the shuttle-driver, secured to the upper end of a rock-shaft or spindle G³, receiving its rocking movements from a cam G⁴ on the cam-shaft G^x of the loom, Figs. 4 and 5, acting on a lever G⁵, pivoted to the frame of the loom at G⁶ and connected by a rod G⁷ to an arm G⁸ on the rock-shaft G³.

The shuttle-driver consists of two arms *g* and *g*², hinged together and caused to engage the shuttle by a spring G⁹ in the manner and for the purpose hereinafter described.

H are blades by which the weft-threads inserted by the needle F are beaten up, these blades being carried on a frame H', pivoted to rods H², fitted to slide in guides H³ on the frame A. The rods H² are each connected to an arm H⁴ on a shaft or spindle H⁵, on which shaft or spindle is an arm H⁶, connected by a rod H⁷ to a lever H⁸, on which a cam H⁹ on the cam-shaft of the loom acts to impart to the frame carrying the blades H the necessary sliding motions at the required periods. The frame H' is also connected by a rod H¹⁰ to a lever H¹¹, acted on at the required periods by a cam H¹² on a shaft K parallel with the shaft G^x, so as to cause the blades to descend beneath the warp-threads to admit of the beating up by the lay of the weft-threads 2 inserted by the needle F'. The weft-threads inserted by the needle F' are retained in the open part of the shed by a finger I while the weft-threads 1 inserted by the needle F are being beaten up and while a row of tufts is being inserted. This retaining-finger is carried on a vertically-reciprocating rod I', connected at its lower end to a lever I², acted on by a cam I³, so as to cause the finger I to descend and release the weft-thread when the row of tufts has been inserted and admit of the said weft being beaten up by the lay K to bind the tufts. The lay K is operated by a cam (not shown in the drawings) on the cam-shaft G^x in the ordinary manner.

The weaving is effected as follows: A shed being formed by the heddles C², D', and E', as shown, for instance, in Fig. 7^A, the needles F F' move forward and insert weft 3, the needle F carrying the said weft, the other needle F' entering the shed without a weft-

thread. The lengthened nose of the shuttle G enters the loop of the inserted weft 3, and as the needles F F' make their return movement the shuttle is caused to pass through the said loop, leaving therein a cord which prevents the said weft being withdrawn. The slack of the weft-thread is then taken up in the ordinary manner. The needles having withdrawn from the shed, the lay K is caused to move forward to beat up the weft 3, and the heddle governing the dead-warp then falls, so as to form the shed shown in Fig. 7, and as the lay recedes to its normal position the blades H are caused to move out into the shed and rise between the warp-threads, so that when the needles F F' enter the newly-formed shed, each needle on this occasion carrying a weft-thread, the said needles pass one on each side of the blades H, the retaining-finger I also projecting upward between the two inserted weft-threads 1 2. The lengthened nose of the shuttle G enters the loops of these weft-threads 1 and 2 and the needles withdraw from the shed, leaving a weft-thread on each side of the blades H, which blades are now caused to move forward toward the breast-beam, as shown in full lines in Fig. 1, to beat up the weft-thread 1, the said blades being then caused to descend into the position shown by dotted lines in Fig. 1, the finger I having meanwhile retained the weft-thread 2 in the open part of the shed. A row of tufts is now inserted between the warp-threads in the usual manner, after which the finger I is caused to descend beneath the weft 2, in which said weft is then beaten up by the lay K against the inserted tufts. On the rod I' of the retaining-finger I is a guide-eye Z, Figs. 2, 12, and 13, through which the weft-thread which supplies the needle F' passes. To avoid confusion, this eye Z is not shown in Figs. 1 and 6. The normal position of this guide-eye and retaining-finger is below the point of the needle F', Fig. 12; but when the two weft-threads are to be simultaneously inserted the finger I and the guide-eye Z are caused to rise above the needles F F', as shown in Fig. 13, and in rising the weft-thread is caused by the guide-eye Z to enter the open eye in the needle F' and is carried thereby into the shed. After the needles have returned and a row of tufts has been inserted the retaining-finger I is caused to descend, and with it the guide-eye Z, which latter in its descent disengages the weft from the eye of the needle F', so that at the next insertion of the needles the needle F' will pass over the weft-thread and enter the shed without a weft-thread. As the lay recedes the depending ends of the inserted tufts are by the ordinary comb bent around the shot of weft No. 2 and brought upward to the face of the fabric. The heddles C², D', and E' are next operated by their respective cams, so as to form a shed like that shown in Fig. 7^A, except that the warp E and the warp D will have changed their respective positions, the warp

E in this case having risen with the dead-warp C' and the warp D having fallen to form the lower side of the shed. After the insertion of the needles carrying only one weft is made and the said weft is beaten up by the lay the dead-warp again falls to the lower side of the shed, and the blades H and finger I rise into position, and the two needles make another insertion, each needle carrying a weft-thread one on each side of the blades, so that after the needles have withdrawn the said blades can move forward as before and press up to the fell of the fabric the one weft, while the other is retained out in the shed by the finger I. The row of tufts is then inserted, and when the finger I has fallen and the slack weft pulled up on the selvage the lay moves forward and presses the said weft against the row of tufts, and as the lay recedes the depending ends of the tufts are bent around the last beat-up weft and brought to the face of the fabric, the heddles meanwhile having changed to the position to form the shed shown in Fig. 7^A and the operation hereinbefore described repeated until the required length of fabric is produced. To prevent excess of cord from being drawn from the shuttle G and to insure a firm and even selvage being formed on the fabric, means are provided whereby the shuttle can yield when pressure on the shuttle-cord is excessive. Any suitable means may be provided for this purpose; but we prefer to provide the shuttle-driver G² with a yielding arm *g*, as shown in Figs. 2 and 3, hinged to the body of the driver and connected to the arm G² of the said driver by a spring G³, stops *g*⁴ and *g*⁵ being provided to govern the movement of the said yielding arm *g*.

Hitherto in looms of this description the cam by which the shuttle is operated is shaped so as to cause the shuttle to recede at the required period to allow the weft to be pulled up tightly and the shuttle then to advance to pull its cord out straight and parallel to the selvage. When, however, the lay moves forward to beat up the weft, the shuttle must again recede slightly; otherwise more cord will be drawn from the shuttle, and an uneven selvage results. In practice this latter receding movement of the shuttle at the required times has been difficult to effect in looms of high capacity, owing to its being necessary that this receding of the shuttle takes place only when the lay in its forward movement reaches the exact point where it presses the weft to the previously-inserted weft, and owing to variations in the thickness of the wefts the point where the lay contacts with the weft varies. By permitting the shuttle to yield according to this invention no necessity for the second receding motion of the shuttle is required, while freedom is afforded for adjusting the cams for operating the shuttle and the lay to suit other motions of the loom.

The shuttle-cam, as shown in Fig. 4, has two recesses *h h'*, one for each of the two simultaneously-inserted wefts, into which recesses the bowl *h*² on the lever G⁵ enters one after the other, so as to cause in succession the necessary receding motions of the shuttle to admit of the two simultaneously-inserted wefts being pulled up tightly.

In the double-shed arrangement (illustrated by Figs. 6, 6^A, 6^B, and 8 of the drawings) three needles or weft-inserters F F' F^o are carried in the holder F² and so arranged that when the holder is moved forward to insert the wefts the needles F F', which are arranged as shown in Fig. 2, insert two weft-threads 1 and 2 in the upper shed, as shown in Fig. 8, while the needle F^o carries a weft-thread 3 into the lower shed, two of the said wefts, 1 and 3, being in front of the blades H and the other weft, 2, being at the back of the said blades. Two shuttles in the two shuttle-races G' (shown in Figs. 6 and 6^A) are provided for securing these wefts, one for securing the two wefts 1 and 2 and the other for securing the weft 3, the shuttle-drivers being capable of yielding in the manner and for the purpose described with reference to the single-shed arrangement after the needles have receded, leaving the wefts in the shed, the two wefts 1 and 3 are beaten toward the breast-beam by the blades H, while the weft 2 is retained in the open portion of the upper shed by the retaining-finger I, as before described. A row of tufts is now inserted against the beaten-up wefts 1 and 3 and the retaining-finger I is caused to descend, so as to release weft 2, which weft is then beaten up by the lay against the inserted tufts, the lower depending ends of which tufts are then bent up by the ordinary comb around the weft 2 and the tufts separated from the tuftspools. The shed is now reversed, the warps D being lowered and the warps E raised, while the dead-warp remains central. The needles now again enter the sheds, inserting wefts 1, 2, and 3, as before, and the operations hereinbefore described are repeated until the desired length of fabric is completed.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, we declare that what we claim is—

1. In a loom for weaving moquette carpets or other tufted fabrics the combination of heddles and cams for operating them so as to form and change the sheds in the warp-threads at the required periods; two needles or weft-carriers and means for inserting them simultaneously in a single shed; a lay blades to beat up the weft and a finger or retaining device and means for operating it so as to hold one of the simultaneously-inserted weft-threads in the open portion of the shed, while the other one of the simultaneously-inserted

wefts is being beaten up, and then to release the retained weft to permit of it being beaten up by the lay so as to bind the tufts, substantially as hereinbefore described.

- 5 2. In a loom for weaving moquette carpets or other tufted fabrics the combination of heddles and cams for operating them so as to form simultaneously two sheds in the warp-threads; means for simultaneously inserting two wefts
10 in one of the sheds and one weft in the other of the said sheds; a lay blades to beat up the weft and a finger or retaining device and means for operating it so as to hold one of the two inserted wefts in the open part of one of
15 the sheds, while the other two inserted wefts are being beaten up, and to release the retained weft to permit of it being beaten up by the lay to bind the inserted tufts, substantially as hereinbefore described.
- 20 3. In looms for weaving moquette carpets or other tufted fabrics the combination with a lay and means for forming the sheds in the warp-threads and for simultaneously inserting two or more wefts in the sheds, of a finger
25 or retaining device and means for operating it so as to hold in the open portion of the shed, one of the simultaneously - inserted wefts, while the other weft or other wefts is or are being beaten up, a series of beating-up blades
30 arranged at intervals between the warp-threads, and means for operating the said beating-up blades to press the wefts, which are not held by the retaining-finger, up to the fell of the fabric, and then to descend beneath
35 the warp-threads to permit of the weft which

had been retained in the open shed to be beaten up by the lay substantially as hereinbefore described.

4. In looms for weaving moquette carpets or other tufted fabrics the combination of a
40 needle or needles or weft-carriers for inserting wefts in the sheds, of a shuttle for inserting a cord in the loops of the weft at one edge of the fabric and means for permitting the
45 shuttle to automatically yield to undue pull on the shuttle-cord so as to prevent excess of cord being drawn from the shuttle, substantially as hereinbefore described.

5. In looms for weaving moquette carpets or other tufted fabrics, the combination with
50 a needle or needles for inserting wefts in the sheds formed by the warp-threads, of a shuttle for inserting a cord in the loops of weft to secure the said wefts and form a selvage on
55 one edge of the fabric and a shuttle-driver having a yielding arm which will permit of the shuttle receding in the driver should undue pull be exerted on the shuttle-cord and so prevent excess of cord being drawn from
60 the shuttle substantially as hereinbefore described.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

T. MARTIN SOUTHWELL.
T. W. HEAD.

Witnesses:

ROBERT H. STEWART,
A. G. BARLOW.