

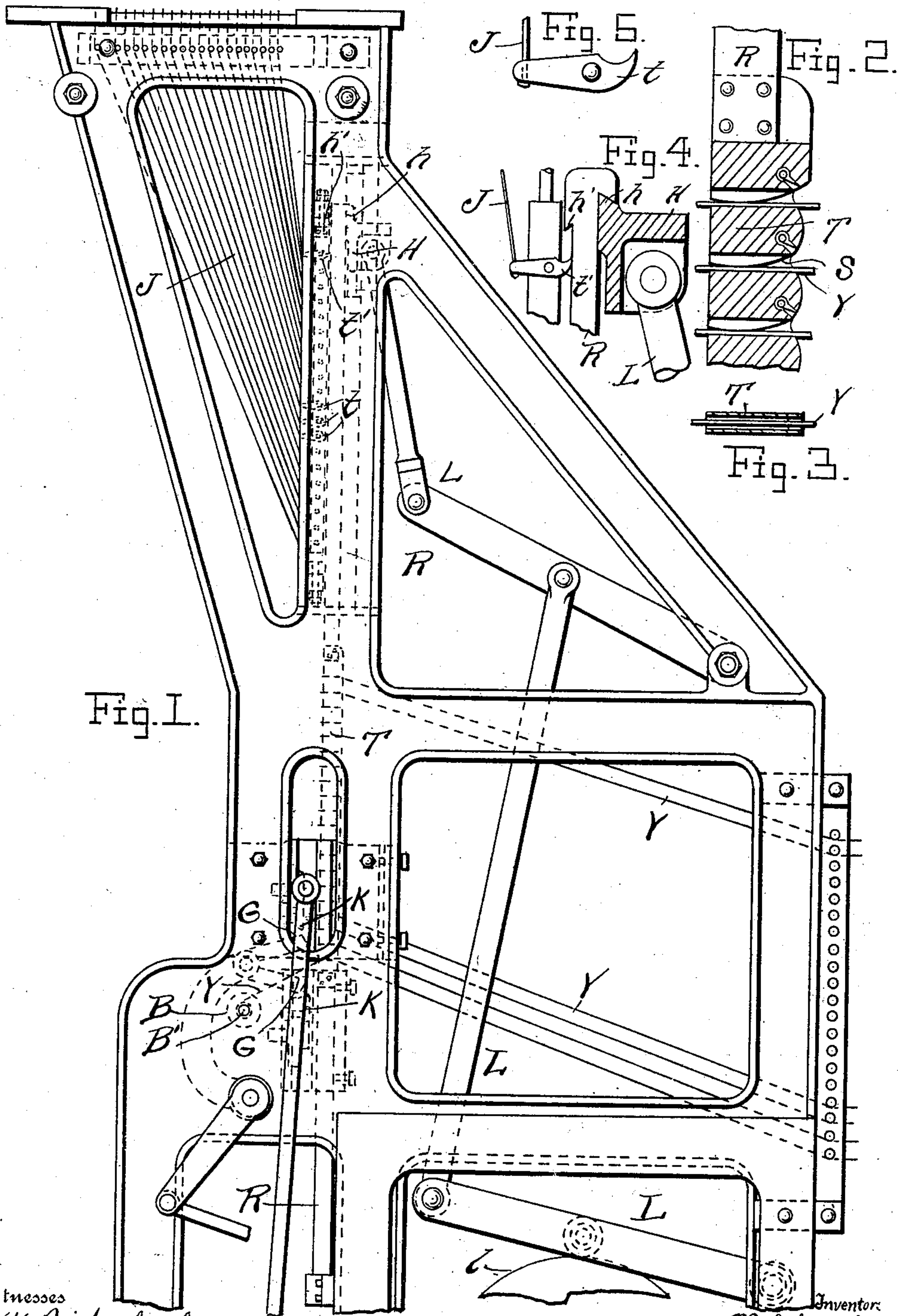
No. 880,169.

PATENTED FEB. 25, 1908.

B. S. & R. N. W. SMITH.  
MACHINE FOR SETTING CARPET WARPS.

APPLICATION FILED NOV. 22, 1905.

5 SHEETS—SHEET 1.



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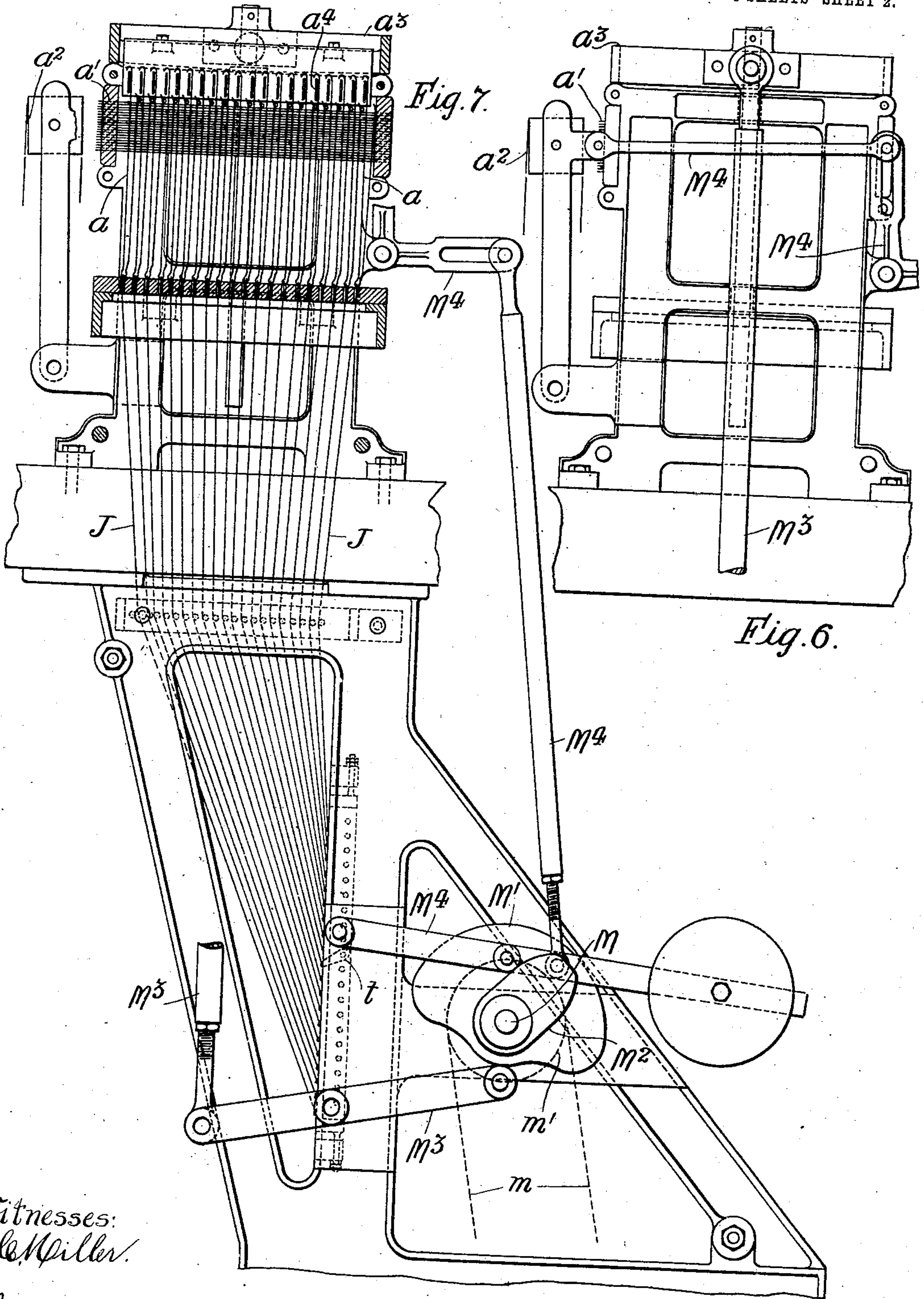
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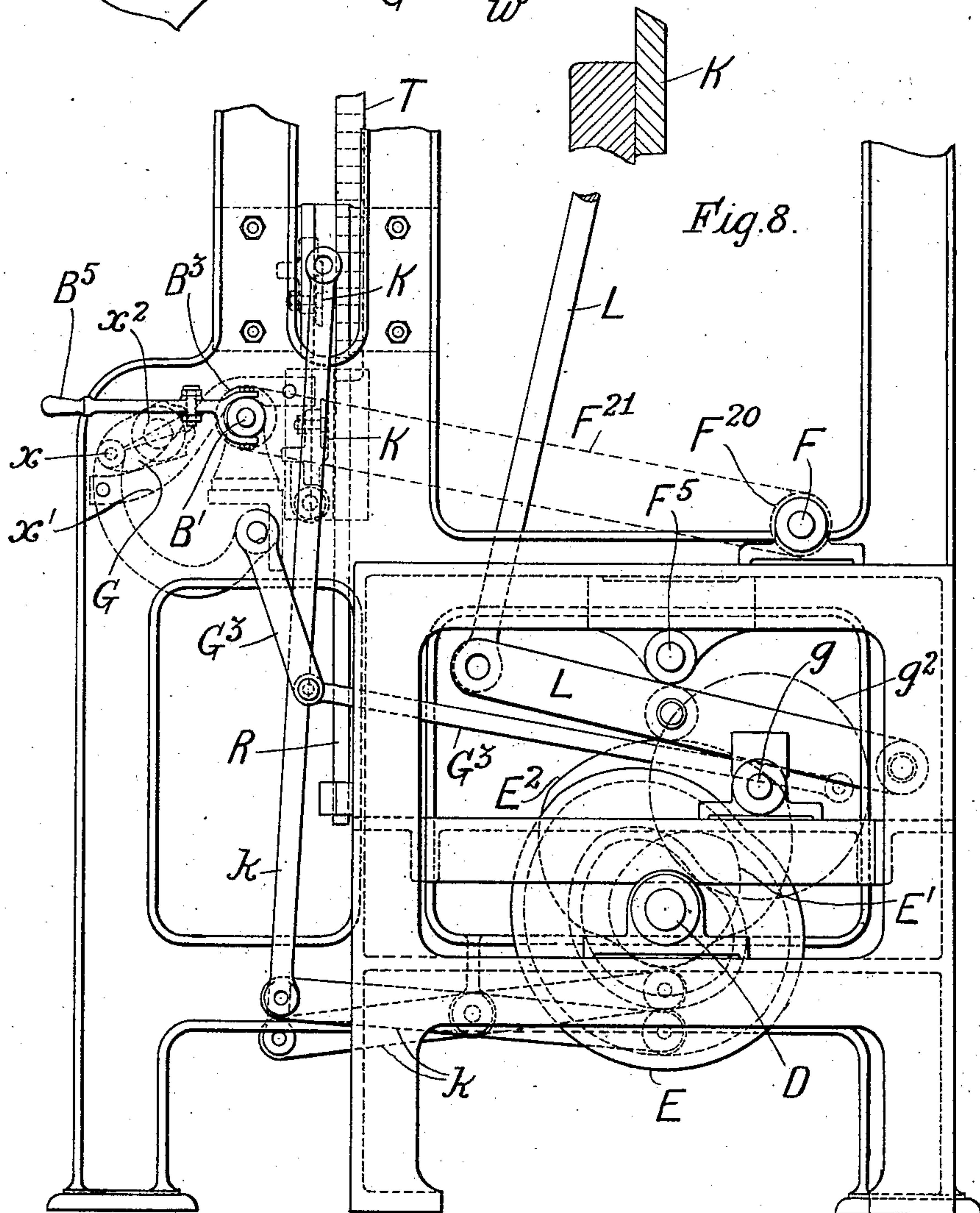
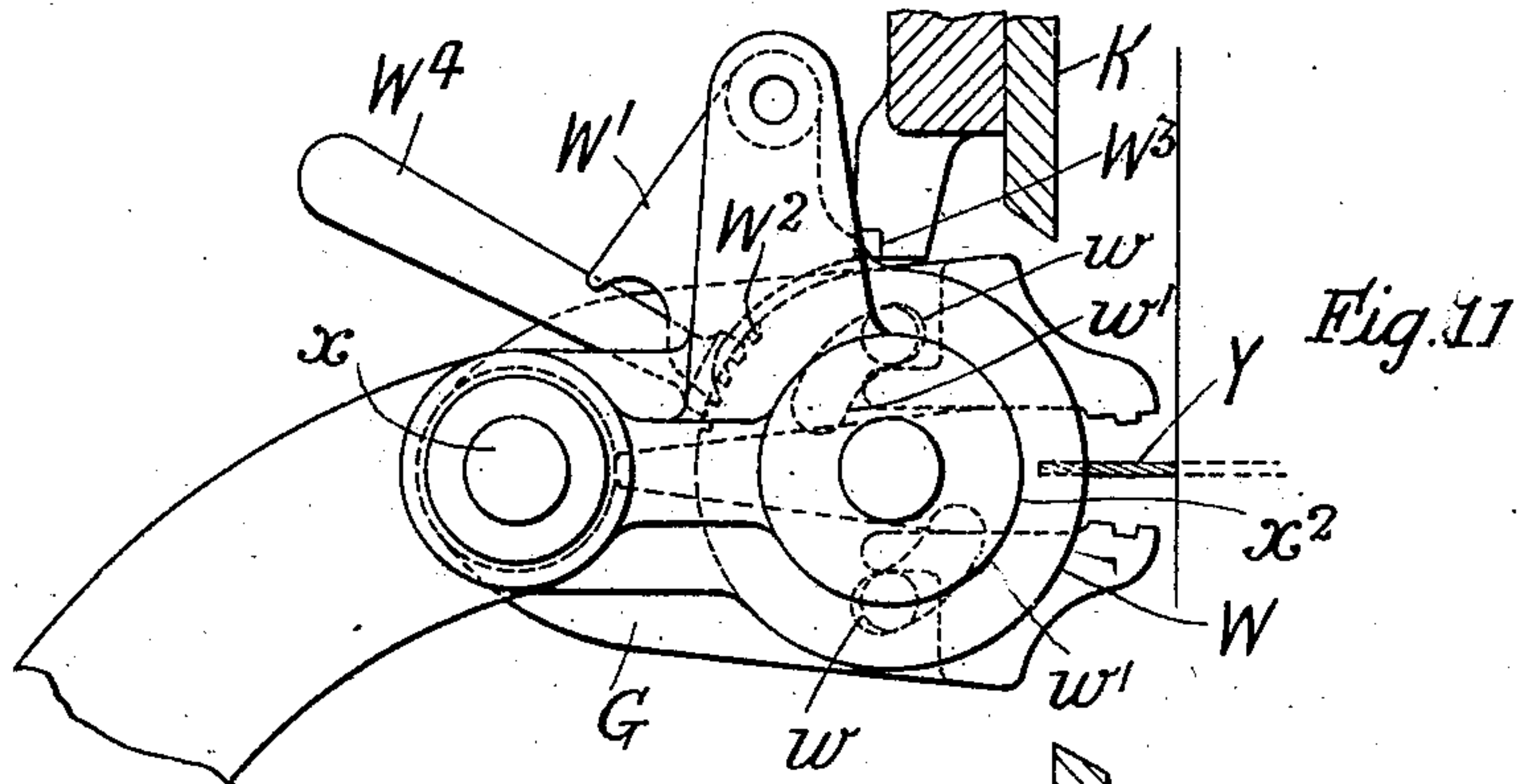
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5 SHEETS—SHEET 3.



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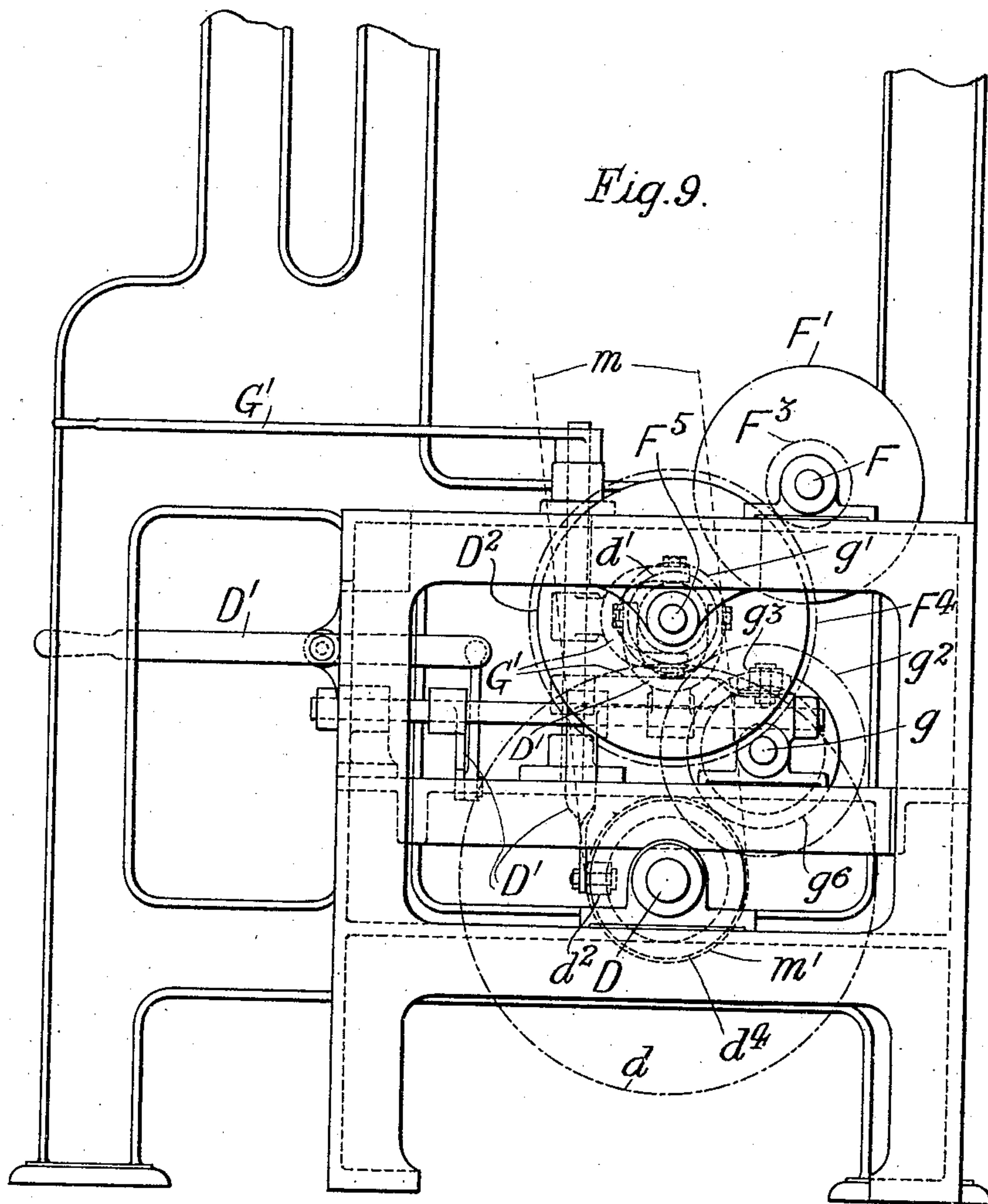
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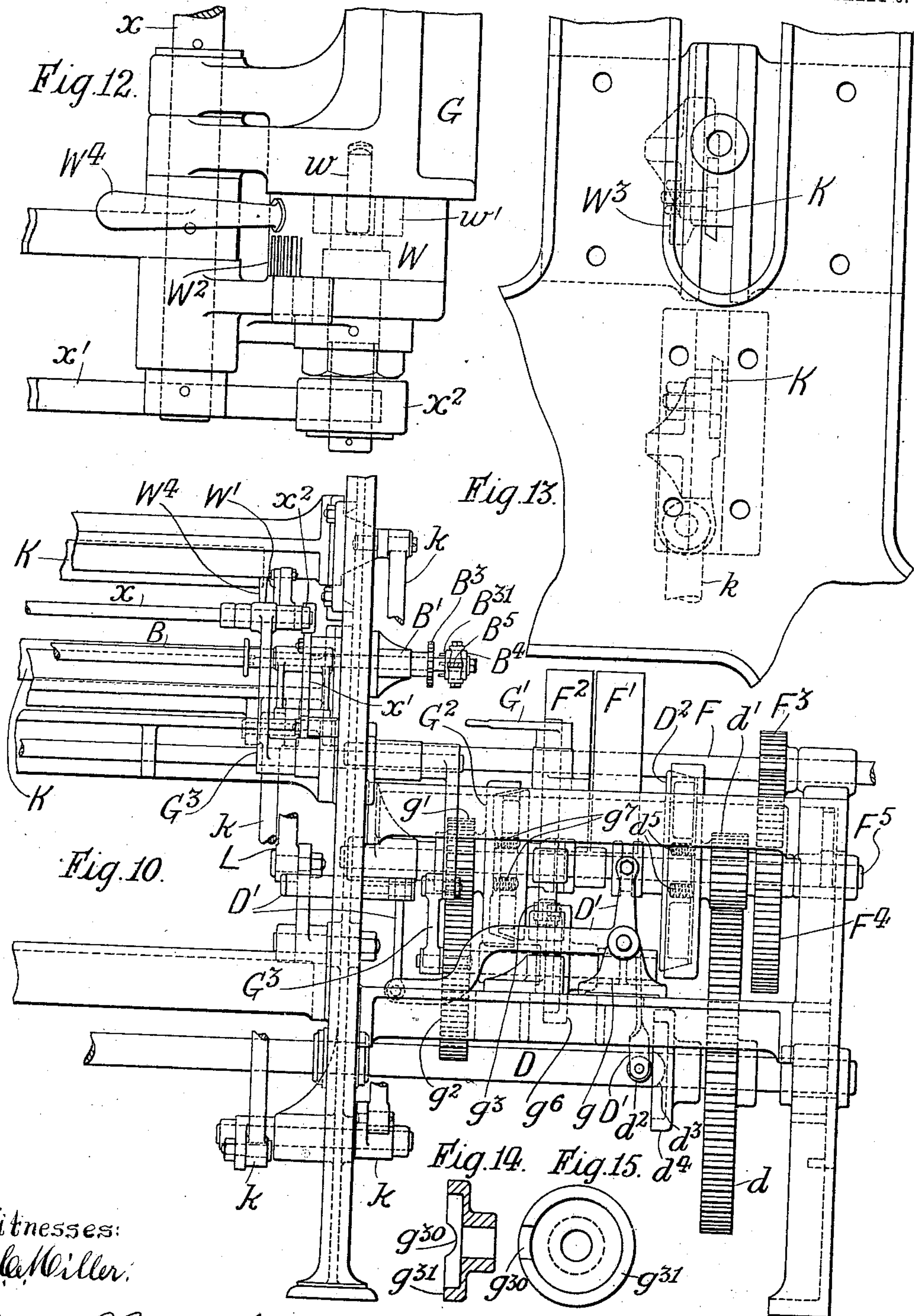
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5 SHEETS—SHEET 5.



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# UNITED STATES PATENT OFFICE.

BENJAMIN S. SMITH AND RICHARD NORVILLE WATSON SMITH, OF PAISLEY, SCOTLAND.

## MACHINE FOR SETTING CARPET-WARPS.

No. 880,169.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed November 22, 1905. Serial No. 288,566.

*To all whom it may concern:*

Be it known that we, BENJAMIN SINCLAIR SMITH and RICHARD NORVILLE WATSON SMITH, both subjects of the King of the United Kingdom of Great Britain and Ireland, and residing at Paisley, Renfrewshire, Scotland, have invented a certain new and useful Machine for Setting Carpet-Warps, of which the following is a specification.

10 The invention has for its object the provision of mechanical devices for setting the tuft yarns (which form the pile on the carpet) on the wide bobbins used in weaving what are known in the trade as imperial  
15 Axminster carpets.

The invention consists of a jacquard or like apparatus working in conjunction with a winding machine and a frame or bank to carry any desired number of bobbins. The  
20 jacquard raises or lowers or raises and then lowers the colored yarns as selected by the card in the usual known way the height desired so that each selection of the colored yarns by each card is then wound on a wide  
25 bobbin separately (the width of the wide bobbins on which the yarns are wound being equal to the width of the carpet). The length of the colored yarn wound on each  
30 of the wide bobbins is as arranged according to the length of the pile of the carpet and the quantity of repeats of the design that is to be woven. The wide bobbins are afterwards arranged in the known manner on an endless chain and operated upon by fingers or nippers  
35 in the loom in the manner usual in weaving imperial Axminster carpets. In the past this setting of the colored yarns according to the painted design, has been done by hand labor. A frame being made to hold 190  
40 or other quantity of bobbins, the end of the yarn of each bobbin on the frame is taken and arranged according to the design to be made, on one large bobbin 27" wide or more or less according to whether the carpet to be  
45 made is to be 27" wide or more or less, then the 190 threads are wound on to this wide bobbin, the length of the yarn wound being according to the number of yards of carpet to be woven.

50 The number of bobbins to be handled by the operator is very great, according to the length of the design that is being made. For example, to set or arrange those wide bobbins for a design 36" long with 8 rows of  
55 tufts of yarn to the inch of the carpet, would

require the operator to arrange the frame of 190 bobbins by 36 by 8 equaling 54,720 operations. In our method we arrange in a frame 3800 bobbins more or less. We paint the design to suit any number or all of these  
60 3,800 bobbins. In the jacquard we have 3,800 tail cords more or less each controlling one of the 3,800 colored yarn threads.

The card when taking its impression on the jacquard operates so that when the lifts  
65 of the jacquard are raised 190 of the ends of the colored threads are presented to an arranged level.

Any mechanical arrangement can be used to grip the 190 ends and pull them over the  
70 large bobbins 27" wide. We prefer to wind on to each large bobbin enough of the yarns for one row and the repetitions thereof in the repeats of the pattern for a carpet say 45  
75 yards long, or even for say four to five times this length of carpet, but obviously in place of using only one such bobbin for carrying such lengths of yarn two or more may be used. The attendant fixes those ends to the  
80 bobbin in the usual way and by the operation of a clutch lever causes the winding mechanism to act on the wide bobbin, which is rotated as many times as desired according to the number of yards of carpet that are to be  
85 woven. If a design is 36" long and there are 8 rows of tufts to the inch of the carpet, then the jacquard has to operate 36 times by 8 which equals 288 operations, compared with the hand manner of doing this before this  
90 invention, of 54,720 operations for the same size of design and quality of carpet to be made.

Another known way of weaving of this carpet is by having a frame at the back of the loom with a certain number of bobbins in  
95 it. Each end of yarn of each colored bobbin is controlled by a jacquard tail or wire, but as the jacquard has to operate for each row of tufts or 288 times to the yard of carpet woven (if there are 8 rows of tufts to  
100 the inch on the carpet) it is a slow expensive method, compared to our invention, in which the jacquard in operating 288 times could set the tuft yarns to weave 400 yards of carpet thus doing 400 times the work.  
105

In the accompanying drawings which illustrate the invention Figure 1 is a side elevation of part of the tuft setting and winding apparatus. Figs. 2 and 3 are vertical and  
110 horizontal sections respectively of the yarn



carrier. Fig. 4 is a transverse section of the bar which raises the yarn carriers and is shown in engagement with an extension of one of said carriers. Fig. 5 shows one of the  
 5 tilters which are adapted to intercept the downward movement of the yarn carriers. Fig. 6 is an elevation of the jacquard or selecting machine and lever connections and Fig. 7 is an elevation (in part section) of the  
 10 jacquard machine fitted on the top of the tuft setting and winding frame. Fig. 8 is an elevation of part of the tuft setting and winding frame with cams and connections for operating several parts of the machine.  
 15 Figs. 9 and 10 are part elevations at right angles to each other showing the driving gear. Fig. 11 is an elevation and Fig. 12 a plan to an enlarged scale showing detail views of the gripper, while Fig. 13 is an ele-  
 20 vation showing the guillotine also to an enlarged scale. Figs. 14 and 15 are detail views of a disk hereinafter referred to.

As shown, the tails or cords J of the jacquard or tuft setter which is of ordinary construction, in lieu of carrying weights are each  
 25 attached to a short pivoted lever  $t$  which we term a "tilter". The several tilters are normally in an inclined position out of action, but such of them as are operated by the card,  
 30 namely one in each row, are brought to a horizontal position as is indicated at  $t^1$  (Figs. 1 and 4), in which position each serves to intercept the downward movement of a corresponding yarn carrier T and bringing said  
 35 carrier to rest. The carriers T each carry a number of ends of yarns Y, in the present instance 20, which pass thereto from bobbins and are led through separate orifices in the carriers and held by tension springs as indi-  
 40 cated to a larger scale at Fig. 2.

The jacquard machine has 20 rows of needles each row consisting of 252 needles. There are 20 rows of tilters  $t$ , and 252 tilters in each row. Each of the tilters is attached  
 45 to a tail J, connecting to an upright  $a$ , so that the needles  $a^1$  of the jacquard when operated on by one of the punctured cards  $a^2$  or design operate on the tilter through the tail on the colored yarn in the carrier as required to  
 50 make the design, as has been arranged by puncturing the card in the usual known way.

There are 252 carriers T across the machine and in each carrier there are 20 openings. In each opening there is a spring  $s$  to act as a  
 55 tension on each thread of colored yarn Y that is threaded through each of the openings.

At the back of the machine the usual bank or frame is arranged to hold 5040 bobbins on which are wound all the colored yarns, one  
 60 color only being on each of the bobbins of the 5040, and the threads of those bobbins are threaded through the openings of the carriers, each thread in a separate opening.

The tilters  $t$  are raised by the usual raising  
 65 lifter  $a^3$  provided with knives  $a^4$  adapted to

engage with the selected uprights  $a$  to which the tail cords J are attached. The carriers T have guide rods R attached to them working in a frame top and bottom. The top  
 70 guide rods R are each formed into separate hooks  $h$   $h^1$ , as shown particularly at Fig. 4, the one side  $h$  of which is formed for raising the yarn carriers T by means of the bar H, at the period when a puncture card  $a^2$  is being  
 75 pressed on the needles  $a^1$ ; the hook  $h^1$  on the other side is formed to catch on the tilters  $t$  that have been raised into the position to catch them according to which tilters have been operated on by the knives  $a^4$  of the usual  
 80 raising lifter  $a^3$ ; and in this way the colored yarns Y in the carriers T as arranged for the design are brought to one level such that they may be engaged by a gripper G operated by mechanism hereinafter referred to.

As shown at Figs. 9 and 10, the first mo-  
 85 tion shaft F is provided with a fast pulley  $F^1$  and a loose pulley  $F^2$  and has also secured to it a pinion wheel  $F^3$  adapted to gear with a spur wheel  $F^4$  on a shaft  $F^5$  on which are mounted clutches  $G^2$  and  $D^2$ , the male por-  
 90 tions of which are operated by hand levers and connections  $G^1$  and  $D^1$  to engage with the female portions which are loosely mounted on the shaft  $F^5$  and which carry pinion  
 95 wheels  $g^1$  and  $d^1$ . The pinion  $g^1$  gears with a spur wheel  $g^2$  on a shaft  $g$ , said spur wheel being arranged to operate the gripper G through crank pin and lever connections  $G^3$ . The pinion  $d^1$  gears with a spur wheel  $d$  keyed  
 100 to a shaft D. The shaft D has secured to it at each end cams  $E$   $E^1$ , (Fig. 8), which respectively operate the top and bottom knives of the guillotine K through lever connections  
 105  $k$ , and the shaft D also carries a cam  $E^2$  which operates (through lever connections L) the bar H adapted to engage with the yarn carriers T. By means of a chain  $m$  and chain  
 110 wheels  $m^1$  the shaft D also drives a shaft M at each end of which are secured cams  $M^1$ ,  $M^2$ , (Fig. 7), arranged to operate the jacquard or selecting mechanism through lever con-  
 115 nections  $M^3$ ,  $M^4$ , which respectively operate the raising lifter  $a^3$  and the jacquard card barrel.

In the operation of the machine:—The  
 115 first motion shaft F drives the shaft  $F^5$  through the gear wheels  $F^3$   $F^4$  and by the attendant operating the hand lever connections  $G^1$  the female portion of the clutch  $G^2$  is engaged by the male portion and so com-  
 120 municates motion from the pinion  $g^1$  to the spur wheel  $g^2$  on the shaft  $g$  which spur wheel  $g^2$ , through crank and lever connections  $G^3$ , operates the gripper G which moves forward and grasps the 252 ends of colored threads  
 125 placed in position and pulls them over a setting bobbin B centered on a spindle  $B^1$ . The gripper mechanism is then automatically stopped through the action of springs  $g^7$  (Fig. 9) disengaging the sliding male portion of the  
 130



clutch  $G^2$  from the loosely mounted female portion, the movement of which male portion of the clutch is effected when a recess  $g^{30}$  in a rotatable disk  $g^6$  (of the type shown at Figs. 14 and 15) on the shaft  $g$ , comes opposite a roller  $g^3$  on the end of one of the lever connections  $G^1$ . The edge  $g^{31}$  of said disk  $g^6$  (Figs. 14 and 15) is arranged to keep the male portion of the clutch  $G^2$  in engagement with the female portion during one revolution of the shaft  $g$ , by contacting with the roller  $g^3$  on the lever connections  $G^1$  which operate the male portion of the clutch  $G^2$ . The attendant now fixes, in the usual known manner, the 252 threads on the bobbin B, and opens by hand the jaws of the grippers G, after which the bobbin is set in motion and the desired number of inches of yarn is wound on the bobbin. Motion is communicated from the shaft F to the bobbin spindle  $B^1$  by a sprocket wheel  $F^{20}$  and chain  $F^{21}$  gearing with a sprocket wheel  $B^3$  loosely mounted on the spindle  $B^1$  the face of which wheel  $B^3$  has recesses adapted to be engaged by pins  $B^{31}$  on a sliding clutch portion  $B^4$ , operated by a hand lever  $B^5$ . When the desired number of inches of yarn is wound on the bobbin B, the winding mechanism is stopped by withdrawing by means of the hand lever  $B^5$  (Fig. 8) the clutch  $B^4$  from engagement with the loosely mounted sprocket wheel  $B^3$ . The attendant now operates (through the lever connections  $D^1$ ) the male portion of the clutch  $D^2$  which engages with its female portion against the power of springs  $d^5$ , and through the intermediary of the gearing  $d^1, d$ , drives the shaft D and likewise the cams E  $E^1$  (Fig. 8), the latter (through the connections  $k$ ) causing the guillotine knives K (shown particularly at Fig. 13) to cut the 252 ends of thread and return said knives to their normal position. The ends of the thread having been cut the bar H, and likewise the yarn carriers T, is raised by the cam  $E^2$  and lever connections L. The next card of the design is then brought against the needles  $a^1$  by the action of the cam  $M^2$  and connections  $M^4$ . Thereafter the raising lifter  $a^3$  is caused to actuate the selected tilters  $t$ , by means of the uprights  $a$  and tail cords J. The bar H and the yarn carrier T are now lowered and each yarn carrier T is stopped by a corresponding tilter  $t$  whereby the desired color of yarns carried by it is brought into line with the gripper G. The shaft D then stops automatically on account of a roller  $d^2$ , attached to one of the lever connections  $D^1$  entering a recess  $d^3$  in a disk  $d^4$  on the shaft D, thus releasing the male portion of the clutch  $D^2$  which is disengaged from the female portion by the springs  $d^5$  (Fig. 10), the edge of the disk  $d^4$  having previously acted on the lever connections  $D^1$  during one revolution of the shaft in a similar manner to the disk  $g^6$ , Figs. 9 and 10. The

bobbin B is now removed, replaced by an empty bobbin and the several operations repeated to fill a fresh bobbin.

The loosely centered jaws of the gripper G, particularly shown at Figs. 11 and 12, are arranged to be opened by operating a disk W having slots  $w^1$  adapted to engage with pins  $w$  on the gripper jaws, which are retained in the open position by a pawl  $W^1$  engaging with ratchet teeth  $W^2$  on the disk W. When the gripper G moves forward and is in position to grip the threads the pawl  $W^1$  contacts with a projection  $W^3$  on the framing which carries the upper knife of the guillotine K, and releases the pawl thus allowing the jaws of the gripper to close. When the threads Y have been pulled into position, and fastened on the bobbin B in the usual known manner, the gripper jaws are opened by manipulating a handle  $W^4$  on the rotatable disk W whose ratchet teeth are engaged by the pawl  $W^1$  to retain the jaws in the open position. The gripper jaws are loosely pivoted on the shaft  $x$  and in their forward and rearward travel are supported at each end on a track  $x^1$  by a roller  $x^2$  (Figs. 8, 10 and 12.)

The specific construction of the machine herein illustrated may be varied without departing from our invention, the essential feature of which is the setting of the tuft yarns for weaving imperial Axminster carpets or similar fabrics by a jacquard apparatus or pattern mechanism or any apparatus controlled by a punctured card or like device operating in combination with winding mechanism.

Having now described our invention, what we claim and desire to secure by Letters Patent of the United States is:—

1. Apparatus for setting and winding tuft or pile yarns for use in weaving imperial Axminster carpets comprising in combination winding mechanism including a wide bobbin and pattern mechanism for selecting the yarns to be wound on said bobbin, as described.

2. Apparatus for setting and simultaneously winding differently colored tufts or pile yarns for use in weaving imperial Axminster carpets, comprising, in combination, winding mechanism including a wide bobbin, mechanism for selecting the yarns to be wound on said bobbin, and jacquard apparatus controlling said selecting mechanism.

3. Apparatus for setting and simultaneously winding differently colored tuft or pile yarns for use in weaving imperial Axminster carpets, comprising, in combination, winding mechanism including a wide bobbin, mechanism for selecting the yarns to be wound on said bobbin, jacquard apparatus controlling said selecting mechanism, and devices for severing the yarns on the completion of the winding operation.

4. Apparatus for setting and simultane-



ously winding differently colored tuft or pile  
yarns for use in weaving imperial Axminster  
carpets, comprising, in combination, wind-  
ing mechanism including a wide bobbin,  
5 mechanism for selecting the yarns to be  
wound on said bobbin, jacquard apparatus  
controlling said selecting mechanism and de-  
vices for bringing the selected yarns to said  
bobbin.

In testimony whereof we have signed our 10  
names to this specification in the presence of  
two subscribing witnesses.

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