

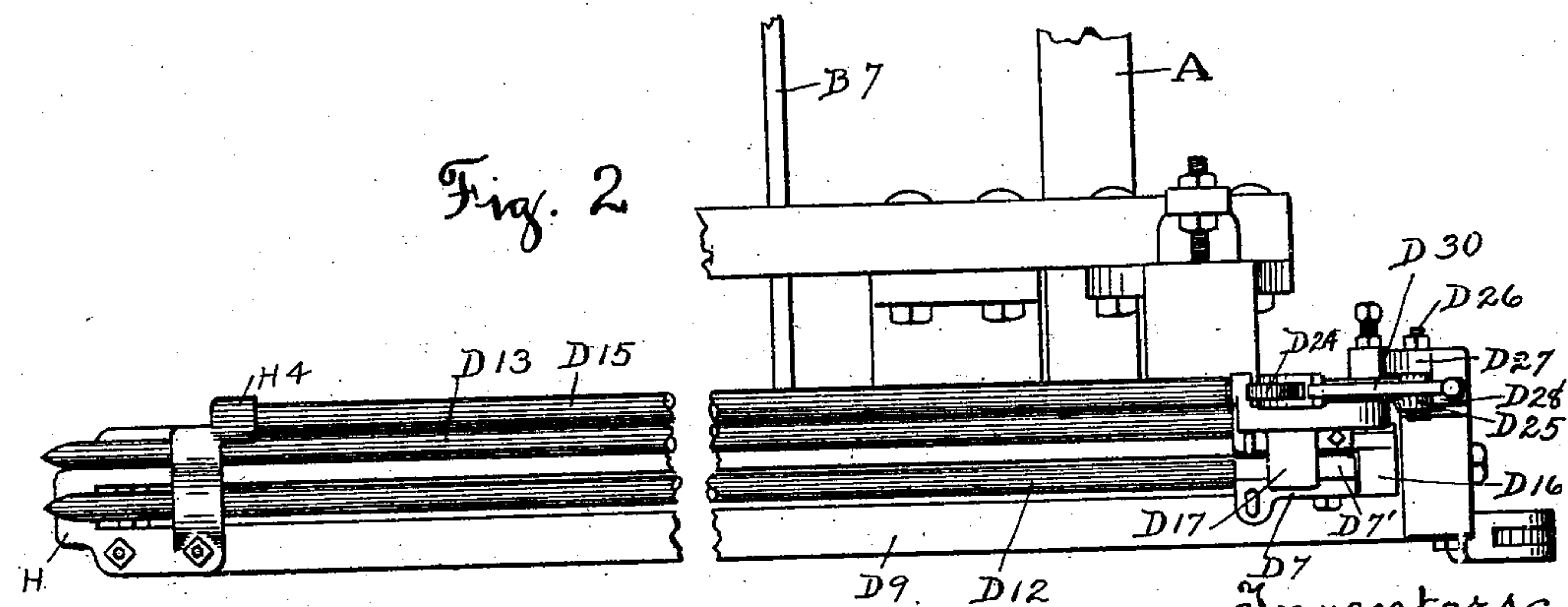
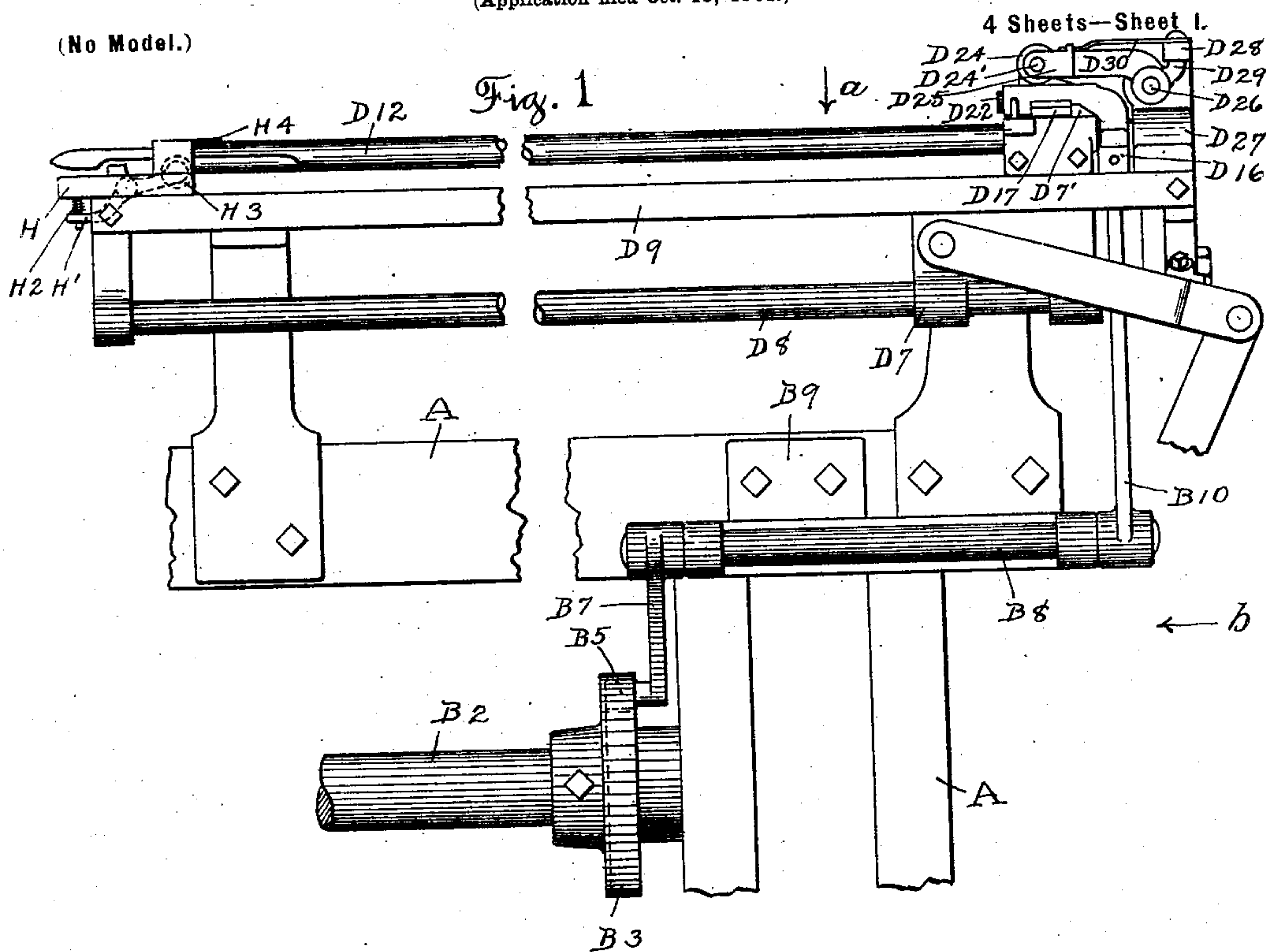
No. 712,888.

Patented Nov. 4, 1902.

H. WYMAN & J. A. CLARK.
LOOM FOR WEAVING TUFTED FABRICS.

(Application filed Oct. 19, 1901.)

(No Model.)



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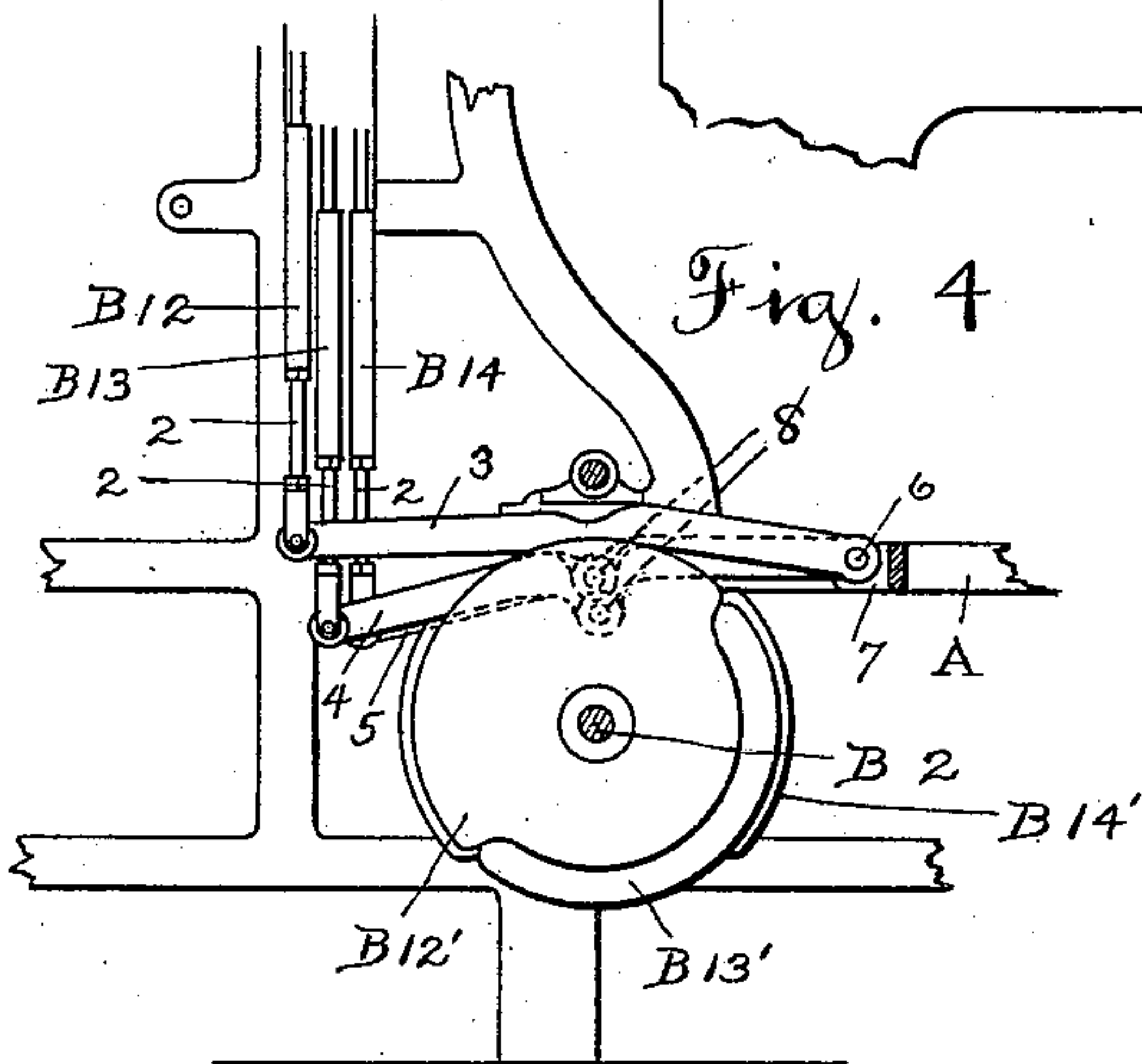
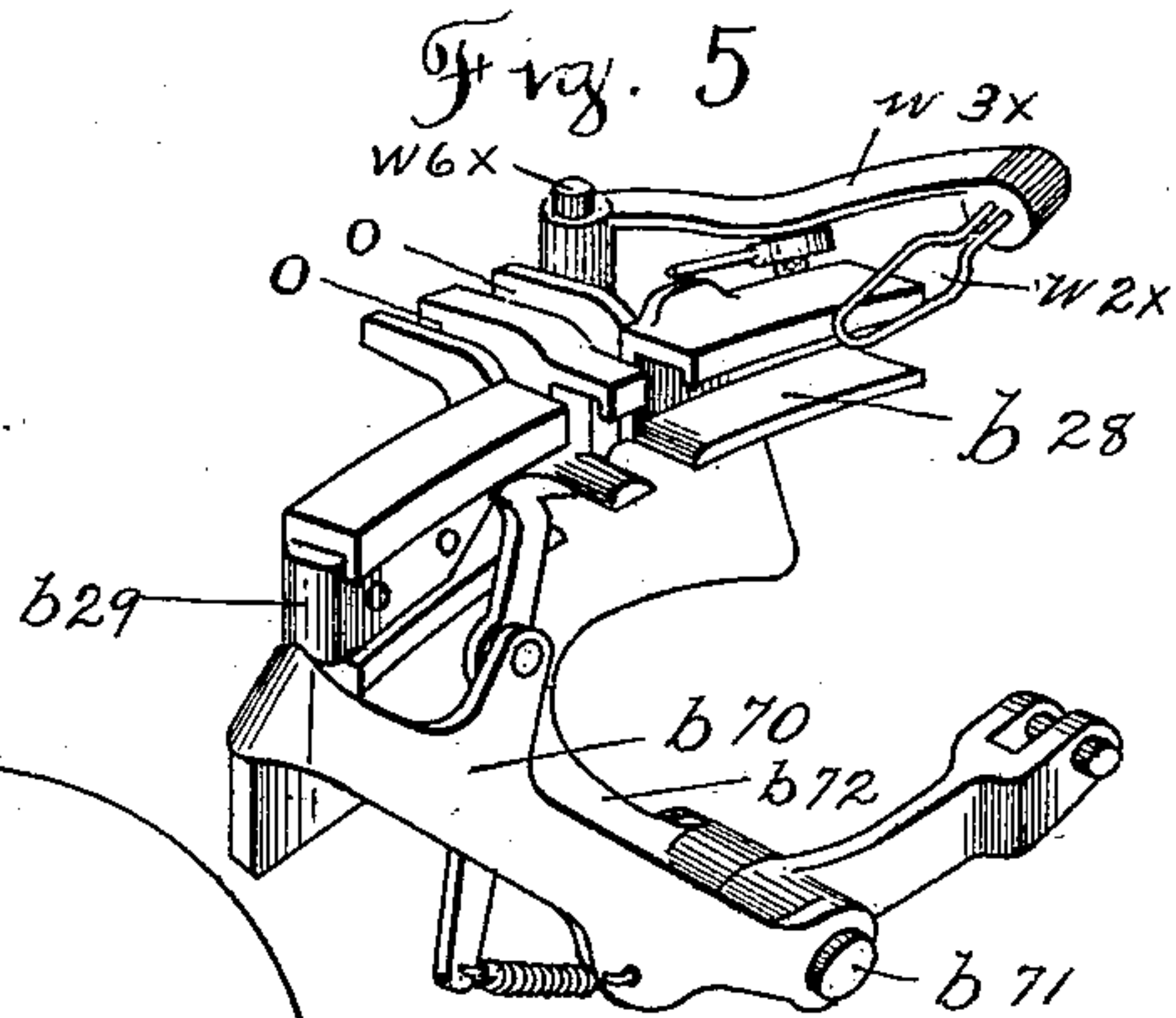
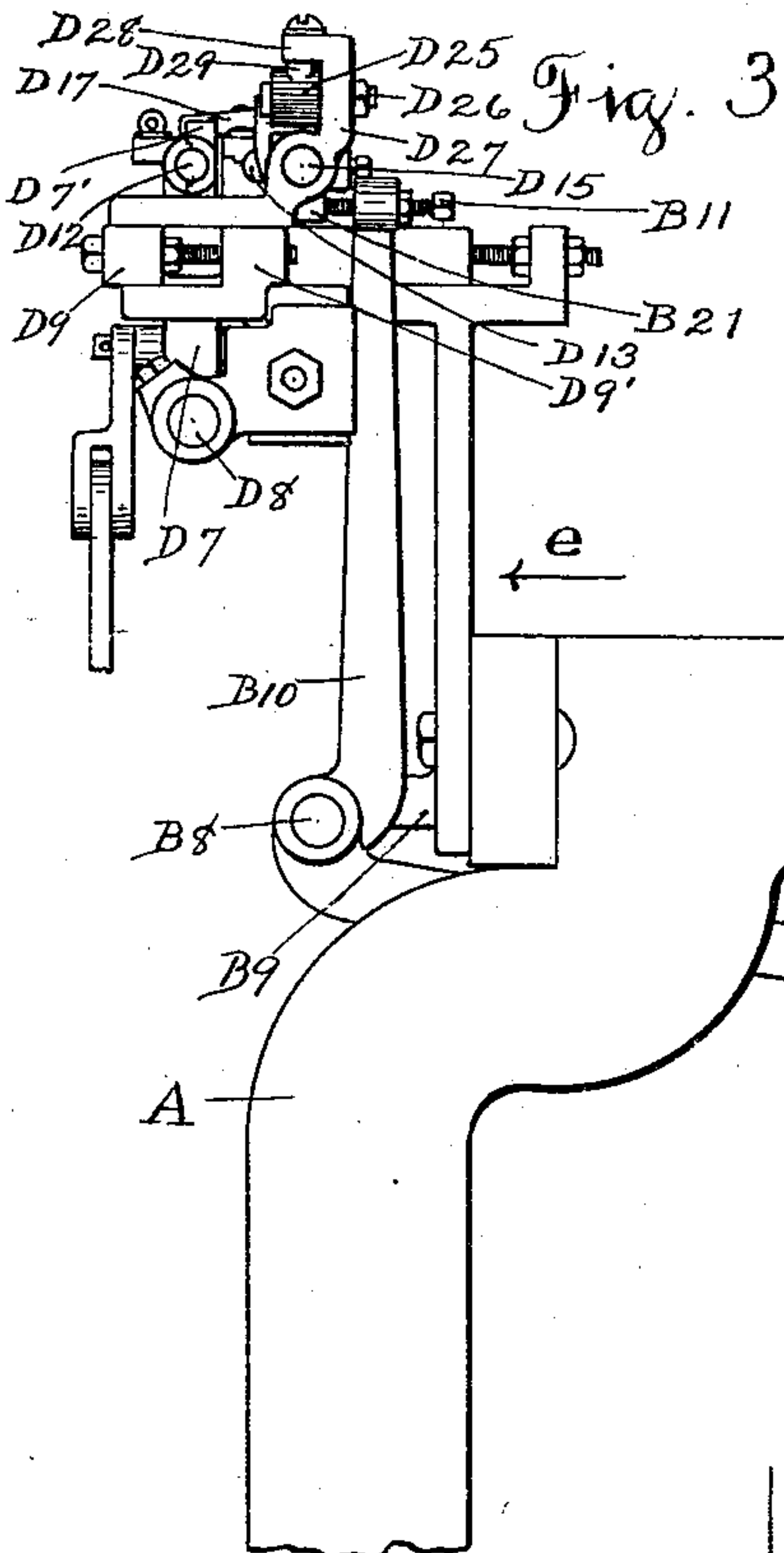
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4 Sheets—Sheet 2.



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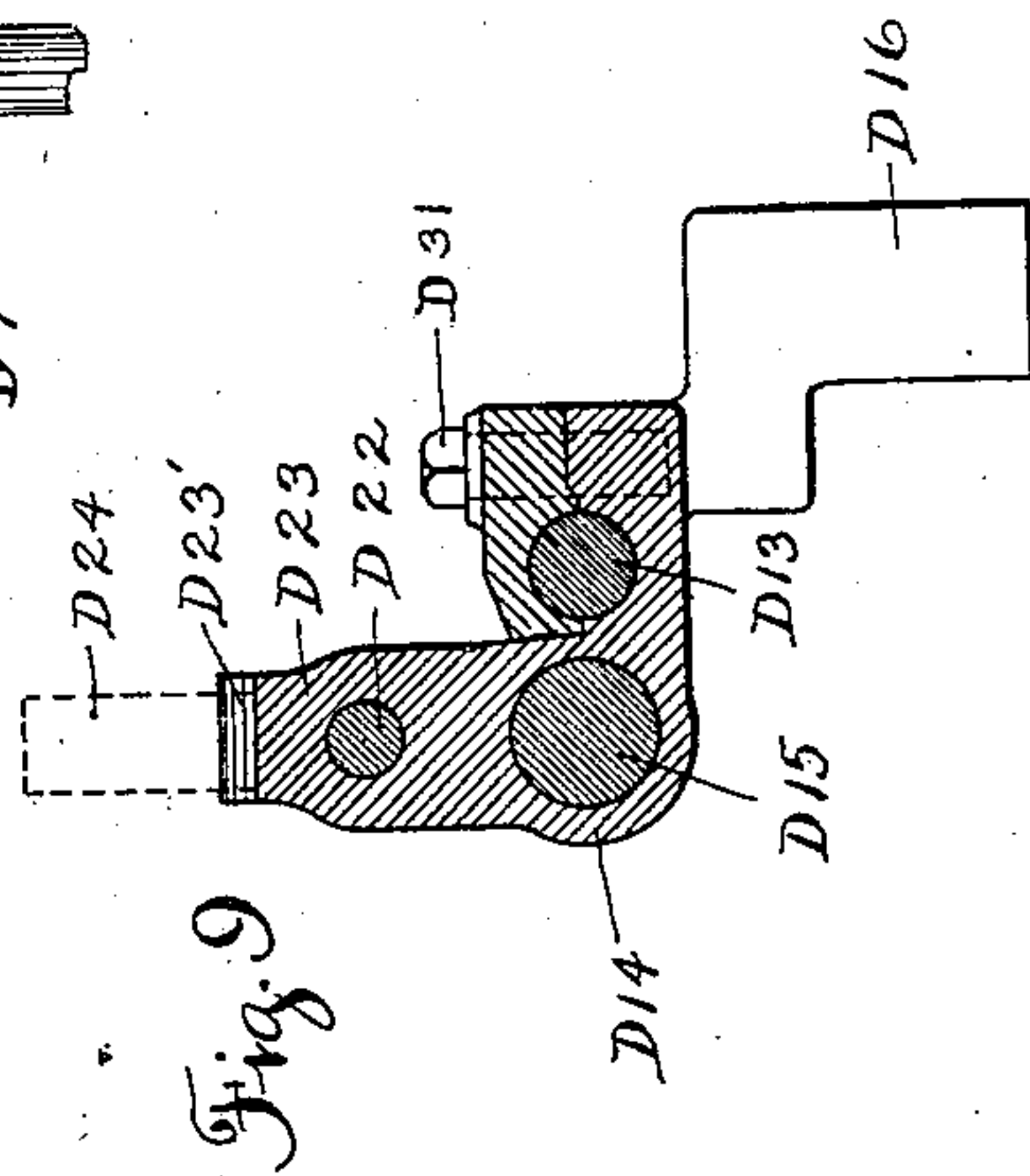
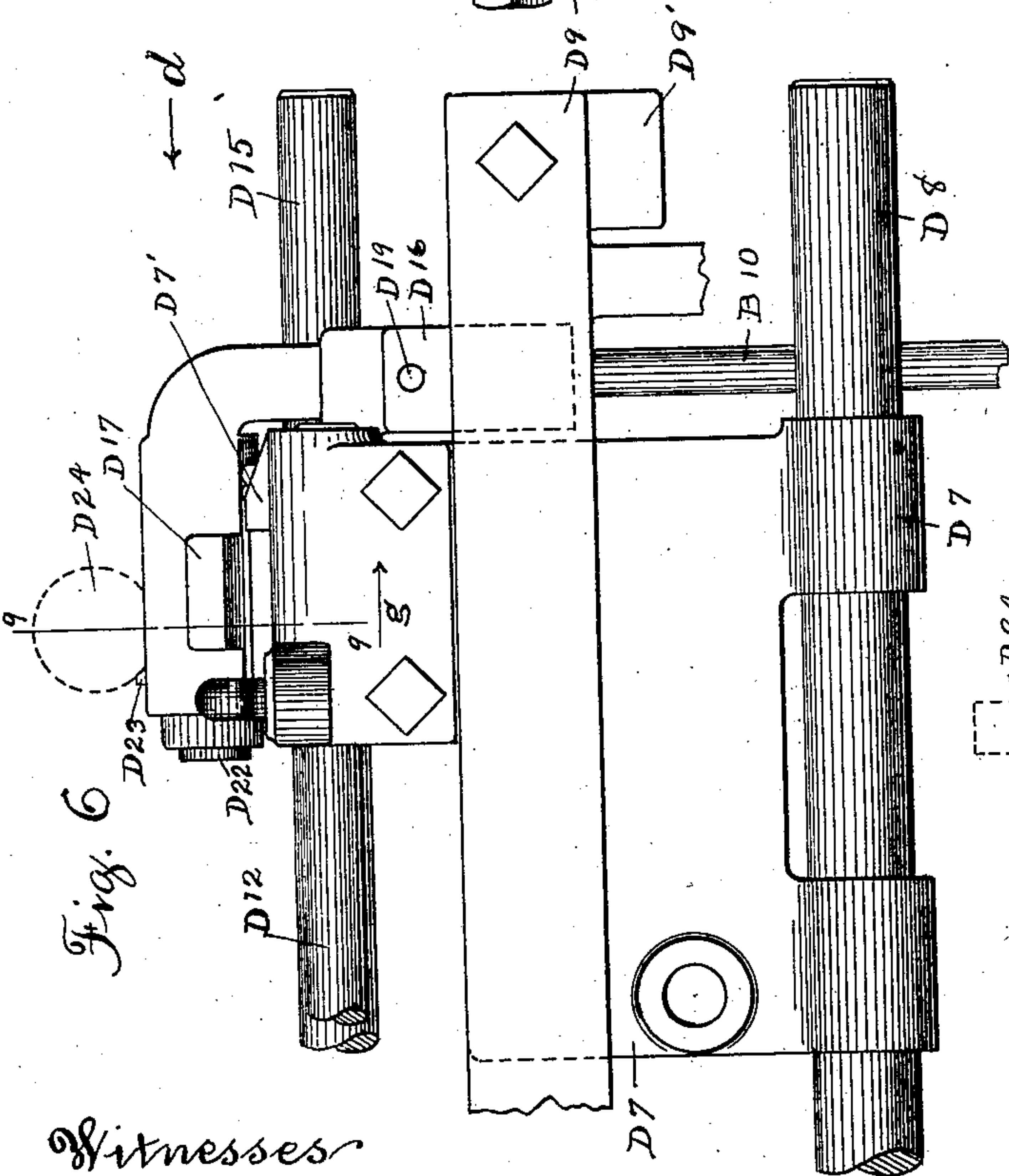
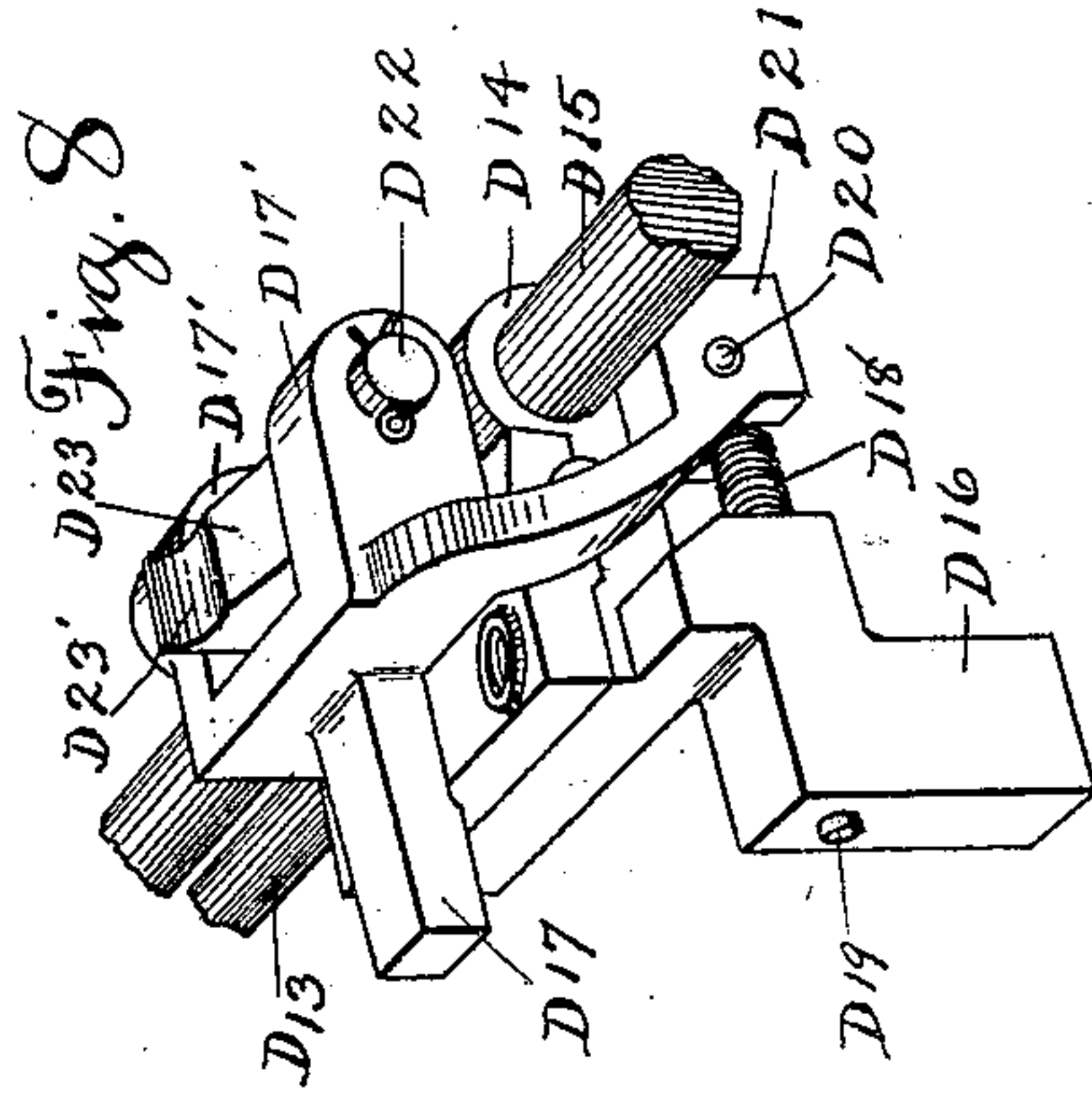
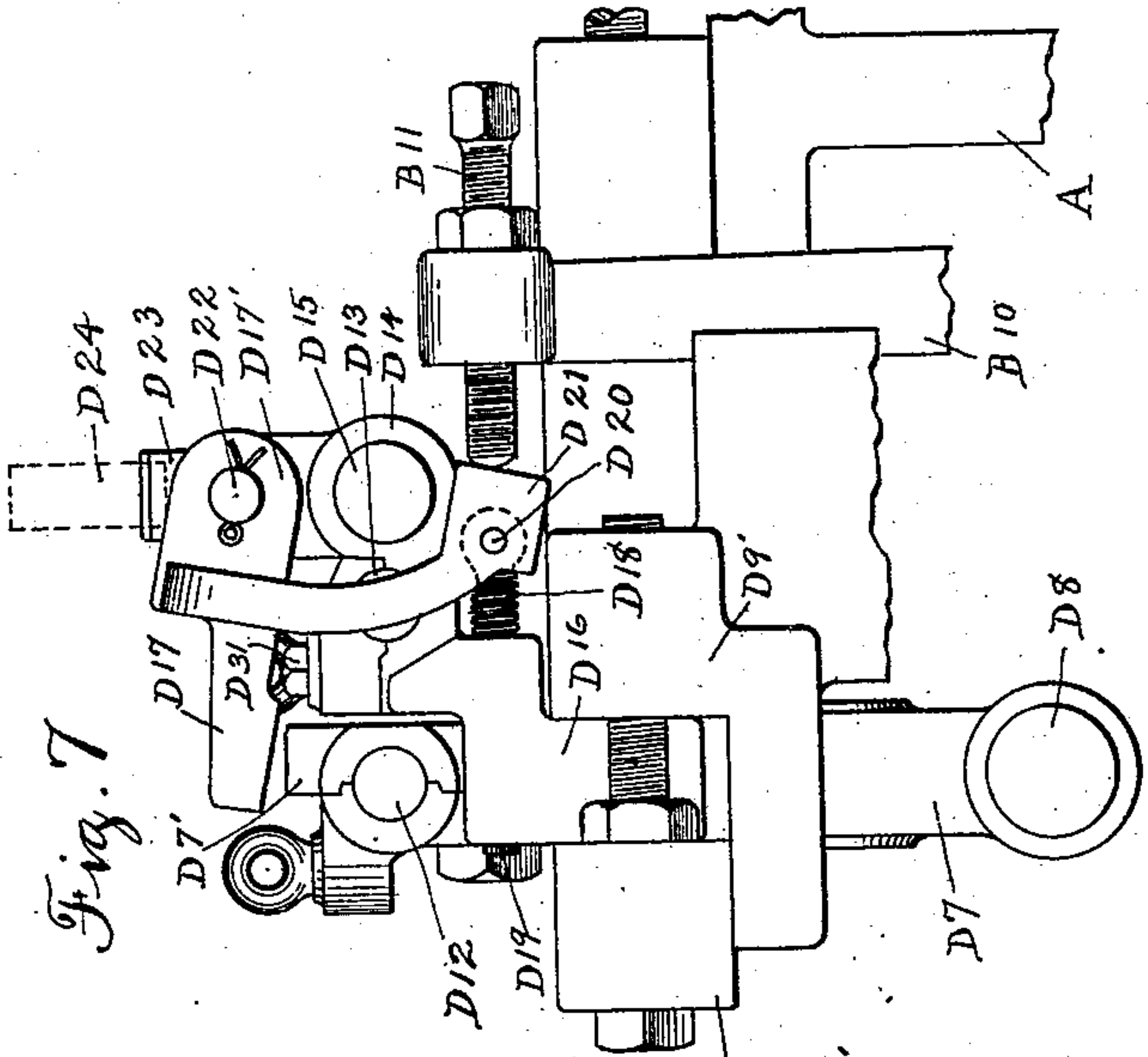
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4 Sheets—Sheet 3.



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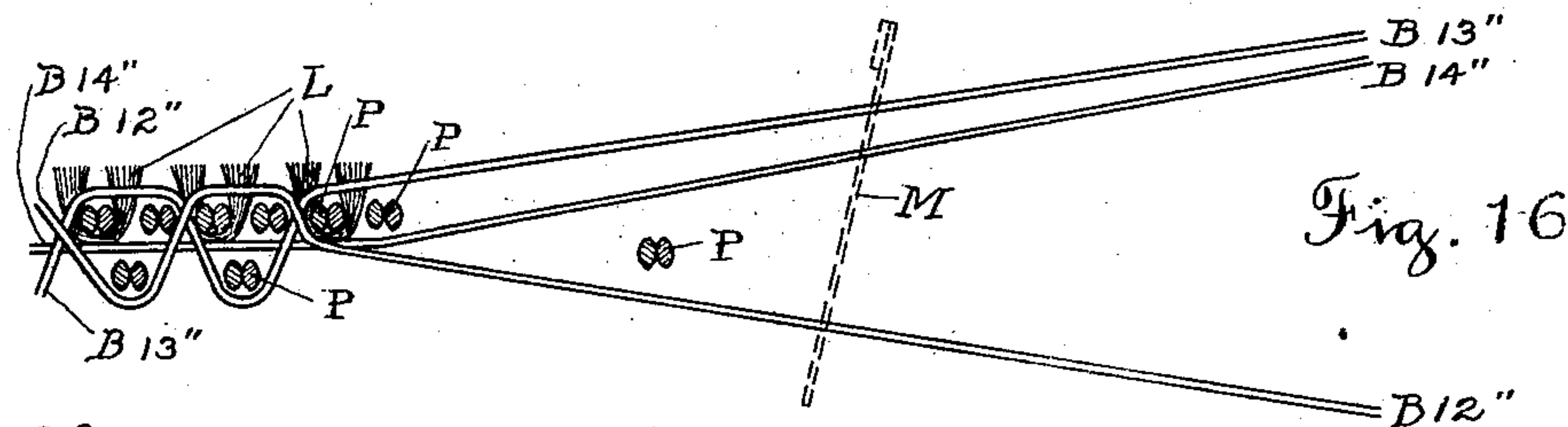
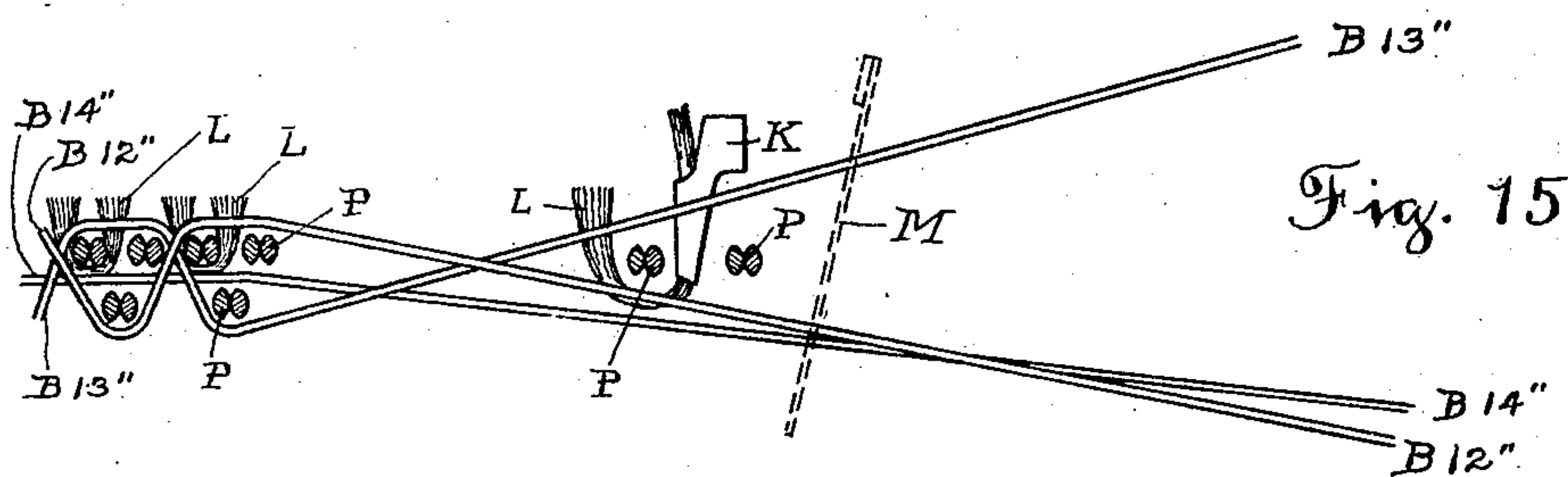
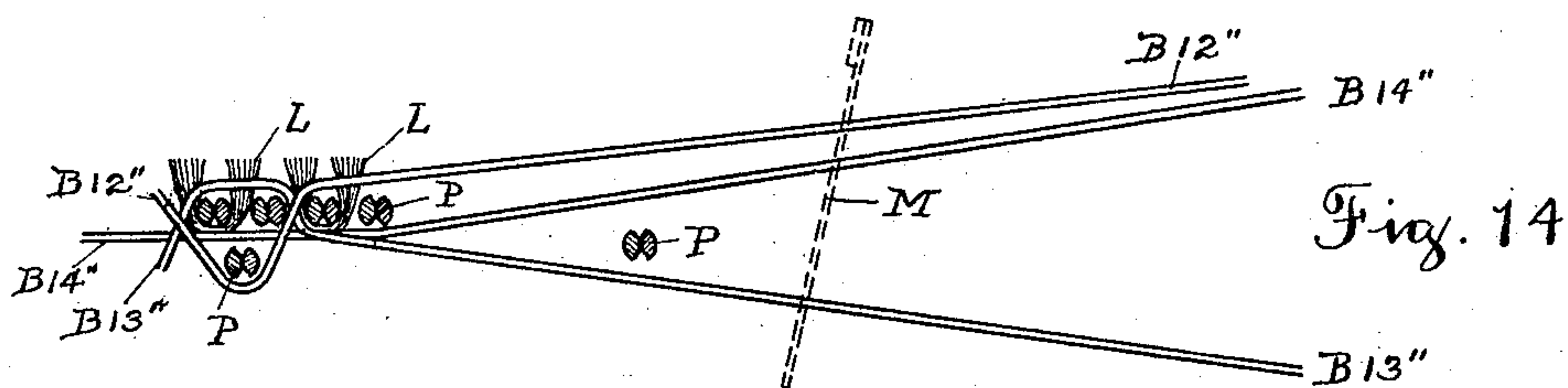
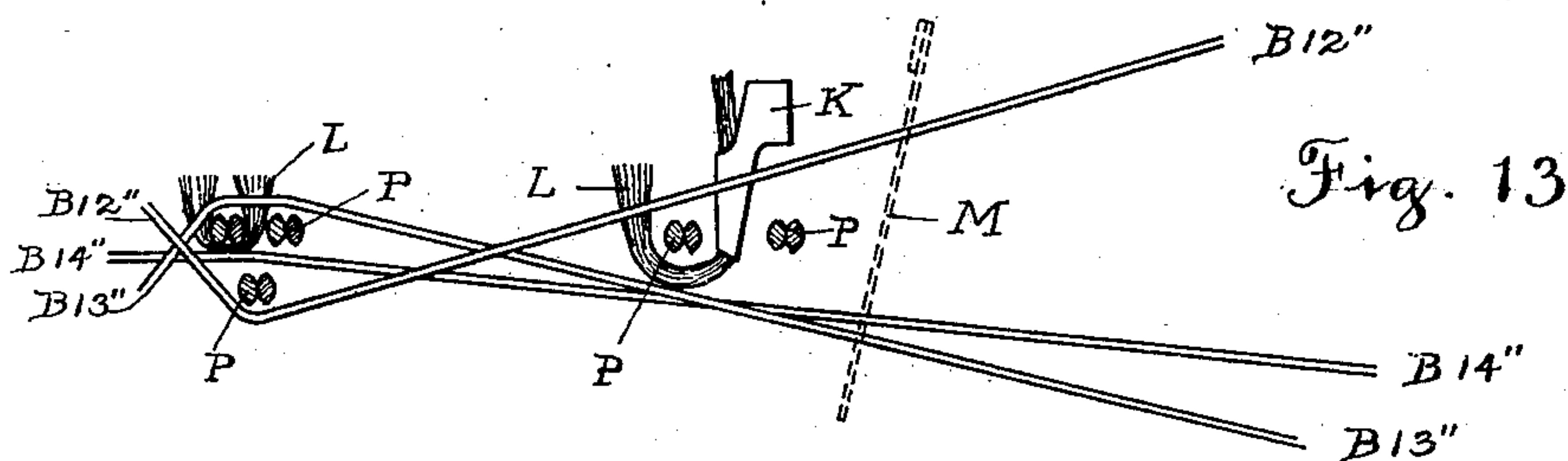
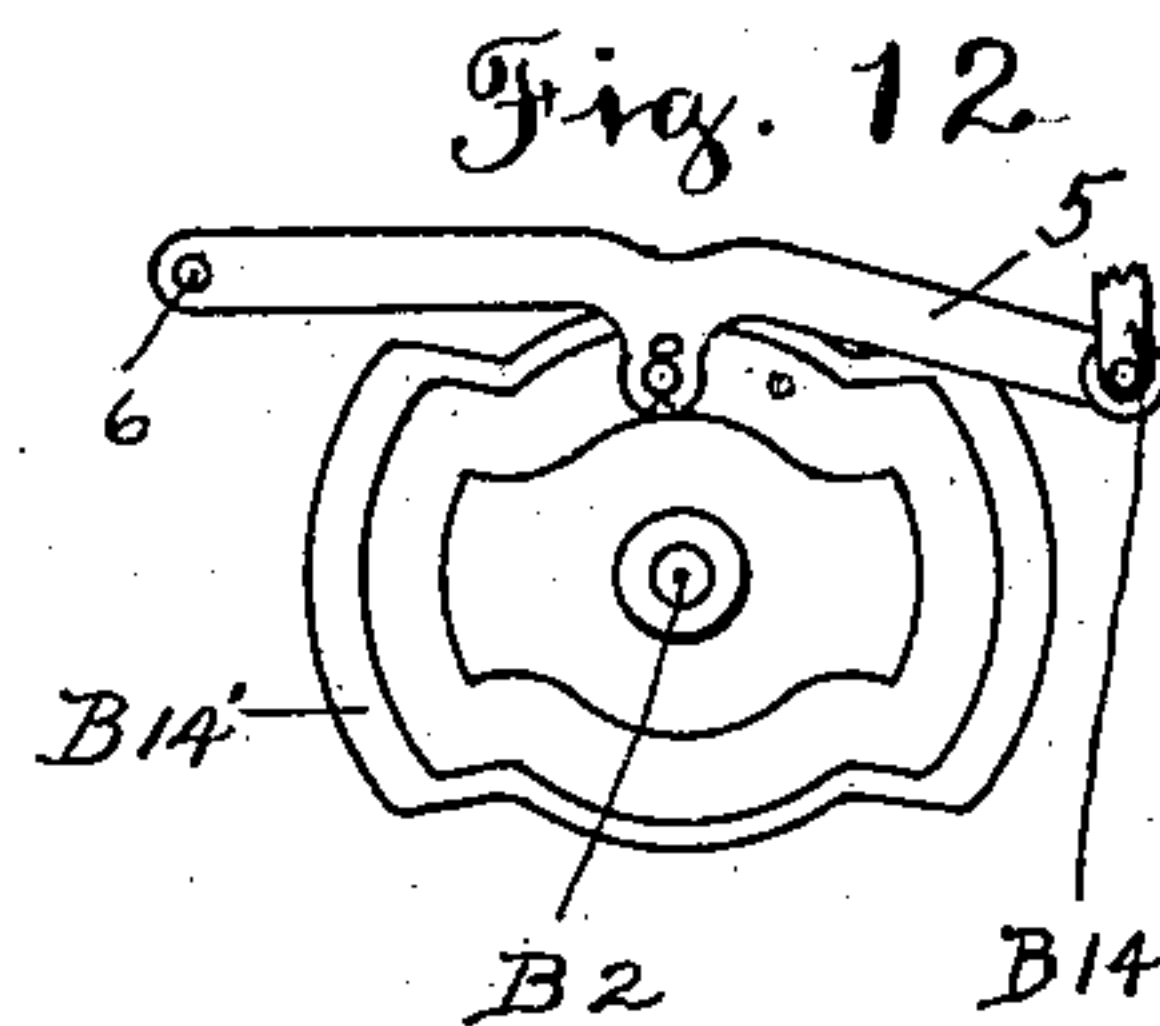
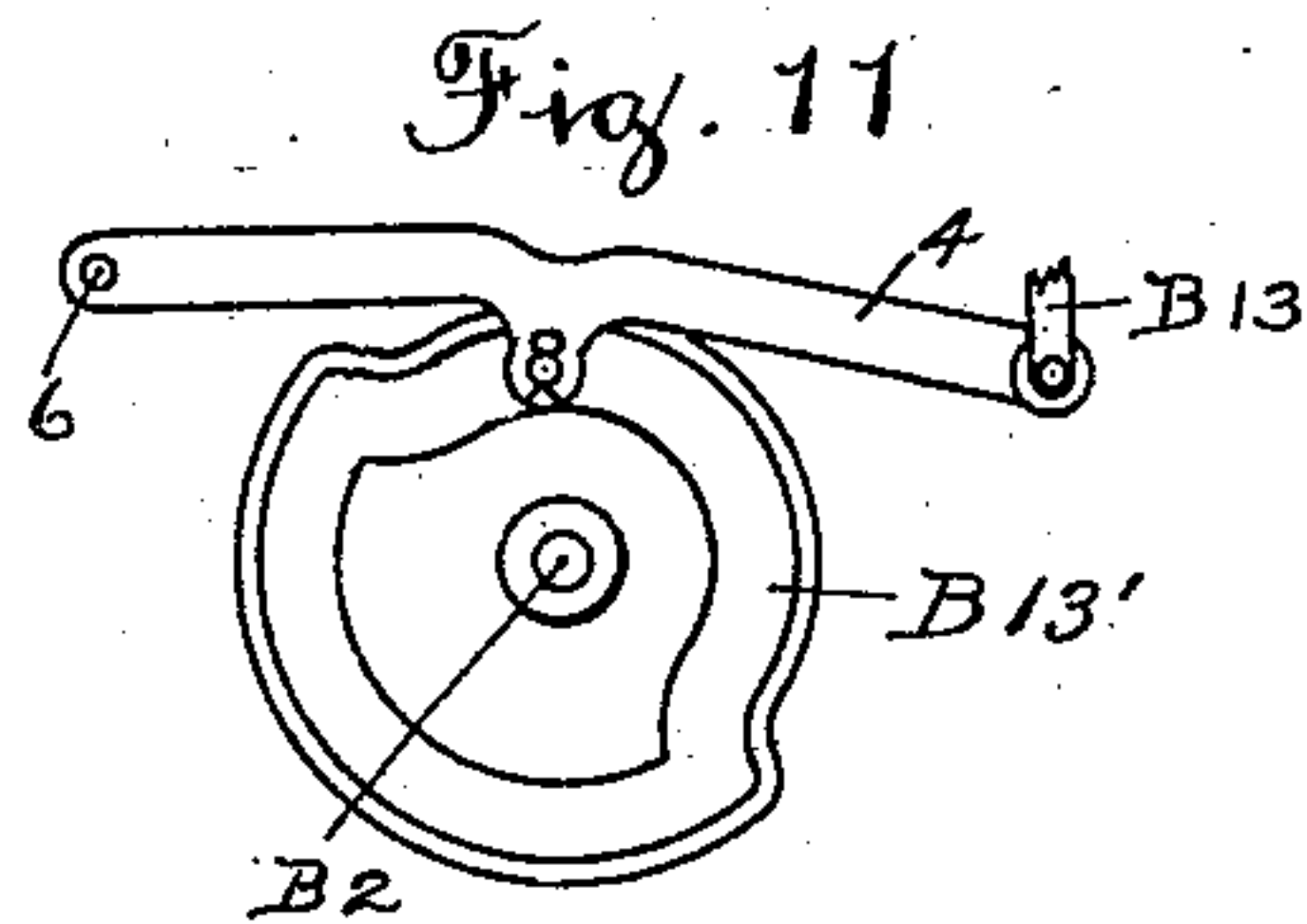
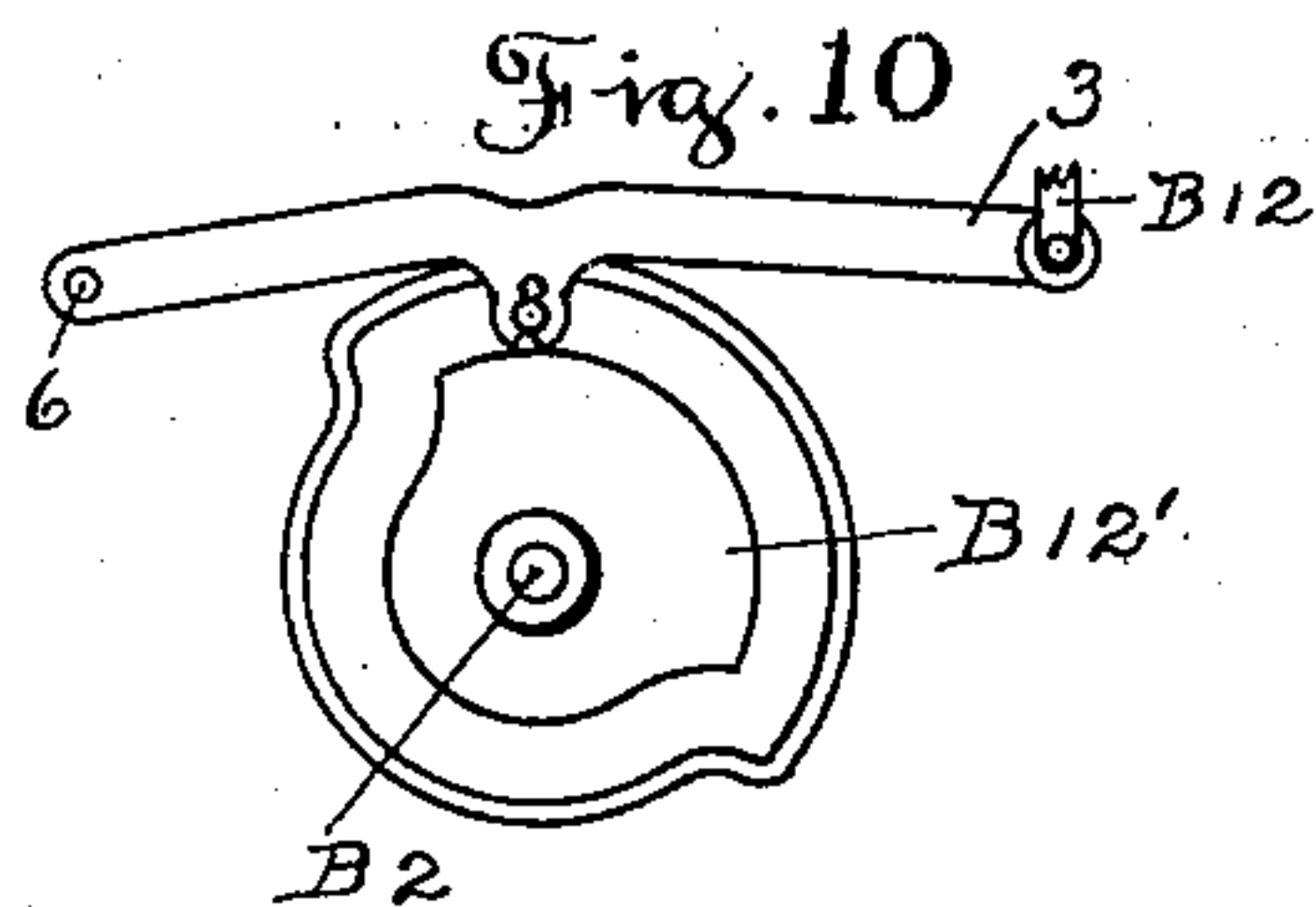
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4 Sheets—Sheet 4.



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LOOM FOR WEAVING TUFTED FABRICS.

SPECIFICATION forming part of Letters Patent No. 712,888, dated November 4, 1902.

Application filed October 19, 1901. Serial No. 79,221. (No model.)

To all whom it may concern:

Be it known that we, HORACE WYMAN and JOHN A. CLARK, citizens of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have jointly
5 invented certain new and useful Improvements in Looms for Weaving Tufted Fabrics, of which the following is a specification.

Our invention relates to looms for weaving
10 tufted fabrics, such as moquette carpets or Axminster carpets, which have a body of warp and weft threads and a surface or face consisting of rows of tufts secured by the warp and weft threads.

15 In our improvements, as hereinafter described, the warp-threads are carried in three harnesses, and four movements of the harnesses are made to form the sheds, and six double picks of weft are used to bind two
20 rows of tufts in place before the harnesses repeat their movements. The first position of the harnesses is with the first harness in the upper plane of the shed and the second and third harnesses in the lower plane of the
25 shed, at which time the tuft-yarn carriers are inserted into the shed preparatory to the insertion of a double pick of weft, substantially as shown in United States Letters Patent Nos. 490,237 and 490,238, of January 17,
30 1893. In our present improvements, however, we insert at the same time with the above-named double pick of weft and in the same shed a second double pick of weft behind the row of tuft-yarn tubes, so that when
35 the tuft-yarn tubes are withdrawn, as described in said patents, there will be left in the same shed one double pick of weft with the tuft-yarns surrounding it, as described in said patents, and also another double pick of
40 weft outside of and behind the tuft-yarns. The continued operation of the loom will then move the third harness into the upper plane of the shed and at the same time the lay will advance and beat up the two picks of weft
45 and the tuft-yarns to the fell of the fabric, leaving, as the lay recedes to its backward position, a second shed for the insertion of a third double pick of weft. The three picks of weft act to hold one row of tuft-yarns in
50 place. As the lay beats up this third pick of

weft to the fell of the fabric and recedes again the harnesses also change, and the first and third harnesses are carried into the lower plane of the shed and the second harness into the upper plane of the shed, thereby forming
55 the third shed of the repeat for the insertion of the tuft-yarn carriers for the second row of tuft-yarns and the insertion of the fourth double pick of weft in the loop of the tuft-yarns and another double pick of weft behind
60 the row of tuft-yarn tubes, as above described as taking place with the first movement described. The third harness then moves to the upper shed and at the same time the lay advances to beat up the two double picks and
65 the tuft-yarns to the fell of the fabric and recedes again, leaving the shed for the insertion of the sixth double pick of weft. As the lay beats up this sixth pick of weft to the fell and recedes again the harnesses also
70 change and the second and third harnesses are moved to the lower plane of the shed and the first harness to the upper plane of the shed, placing the harnesses in the same position above described for the insertion of the two
75 double picks of weft, when the same order of inserting the tuft-yarns and weft-threads and forming the sheds for the same is repeated, as above.

By inserting both double weft-threads into
80 the same shed, one in the loop of the tuft-yarn and one behind it, and beating both picks to the fell at the same time we are enabled to hold or retain the tufts in an upright position on the face of the goods after they have
85 been severed from the carriers, and thereby produce more perfect goods than heretofore made where one weft only, with the tuft-yarn around it, was beaten to the fell and was not supported by the pick of weft behind it, and
90 as the reed was moved back from it the tuft was liable to fall backward into the shed and produce more or less imperfect work. We are also enabled to produce more cloth in a given time than has been heretofore made by
95 inserting two wefts at one time and beating to the fell both wefts at the same time.

In order to carry out our improvements practically in a loom, we preferably form the
cams for operating the three harnesses so that 100

there will be four movements of the harnesses to one revolution of the shaft on which the cams are mounted. The cams are shaped so as to move the harnesses in the same order as above described, and one revolution of the shaft carrying the cams brings into operative position the harnesses for the four successive sheds.

In order to carry the weft into the shed in the manner above described, we may use a weft-carrier substantially like that described in Patent No. 543,821, of July 30, 1895, consisting of a needle carrying a weft-thread and means to move it through the open shed, as described in said patent.

To put the two double picks of weft simultaneously into the same shed, as above described, we use a second needle parallel with the first needle and separated therefrom at such a distance that while the first needle will pass in front of the tubes carrying the tuft-yarns the second needle will pass behind said tubes. Said second needle is guided in ways to move parallel with the first needle and is provided with a clutching arrangement near its outer end, whereby it may be connected with the first needle and carried with it when required into the sheds, and it may be disconnected from said first needle and remain at rest when the first needle is inserting picks in the sheds.

We have only shown in the drawings sufficient parts of a loom corresponding to similar parts shown in United States Letters Patent Nos. 490,237, 490,238, 543,821, and 668,597 to illustrate our improvements and to enable those skilled in the art to which our invention belongs to understand the same.

Referring to the drawings, Figure 1 is a front view of the weft-carriers or needle mechanism, corresponding to Fig. 1 of Patent No. 668,597, with our improvements applied thereto. Fig. 2 is a plan view of the parts shown in Fig. 1 looking in the direction of arrow *a*, same figure. Fig. 3 is an end view of the parts shown in Fig. 1 looking in the direction of arrow *b*, same figure. Fig. 4 shows a part of the shed-forming mechanism with cams properly shaped to move the three harnesses in the order above described to form the proper sheds. Fig. 5 is a detail of the mechanism for actuating the shuttle containing the weft-thread which locks the double filling, corresponding to the mechanism shown in Fig. 15 of Patent No. 490,237, above referred to. Fig. 6 shows, on an enlarged scale, some of the parts shown in Fig. 1. Fig. 7 is an end view of the parts shown in Fig. 6 looking in the direction of arrow *d*, same figure. Fig. 8 is a perspective view of the second needle-carrier. Fig. 9 is a cross-section on line 9-9, Fig. 6, looking in the direction of arrow *g*, same figure, showing a cross-section of the clamp. Fig. 10 shows the opposite side of the first cam and cam-lever shown in Fig. 4. Fig. 11 shows the opposite side of the second cam and cam-lever

shown in Fig. 4. Fig. 12 shows the opposite side of the third cam and cam-lever shown in Fig. 4. Fig. 13 is a diagrammatic view showing the shed formed by the first position of the harnesses in our improvements above described. Fig. 14 shows the shed formed by the second position of the harnesses. Fig. 15 shows the shed formed by the third position of the harnesses, and Fig. 16 shows the shed formed by the fourth position of the harnesses, all as will be hereinafter described.

In the drawings the letters or figures of reference correspond to the letters or figures of reference on similar parts in Patents Nos. 490,237 and 668,597, above referred to.

We will first describe the construction and operation of the weft-carriers or needles carrying the weft-threads.

As described in said Patent No. 668,597, the needle-carrier D^7 slides on the rod D^8 and carries the needle D^{12} into the shed. Parallel to the needle D^{12} is a second or auxiliary needle D^{13} , held firmly at its outer end in the clamp-piece D^{14} , Fig. 9, with a bearing on a rod D^{15} and with its lower part bent downward and then toward the front of the loom—that is, to the left in Fig. 7—and then downward again in the branch D^{16} to enter and be guided in the channel between the parallel bars D^9 and D^9 , Fig. 7. The needle-carrier D^7 has added to it an extension $D^{7'}$ on its upper surface, with an inclined upper face adapted to slide under and raise the pivotally-supported latch D^{17} when the needle-carrier D^7 returns to its outermost position. After the inclined extension $D^{7'}$ has passed under the latch D^{17} said latch D^{17} falls in front of the extension $D^{7'}$, as shown in Fig. 1. The downward movement of the latch D^{17} is insured by the compression-spring D^{18} on the pin D^{19} , which is guided in an opening in the branch D^{16} of the clamp D^{14} and held at the opposite end on its pivotal support D^{20} in the downwardly-extending arm D^{21} of the latch D^{17} . (See Fig. 8.)

The latch D^{17} has two extensions $D^{17'}$, with bearings for the pin D^{22} , on which is mounted intermediate the two extensions $D^{17'}$ the upright extension D^{23} of the clamp D^{14} . Said extension D^{23} is concaved on its upper side at $D^{23'}$ to engage a roll D^{24} , mounted on a pin $D^{24'}$ in the extremity of the arm D^{25} , Fig. 1, which is pivotally supported on a stud D^{26} on a stand D^{27} , said stand D^{27} having the extension D^{28} , against which strikes the stop-piece D^{29} on the arm D^{25} .

A spring D^{30} holds the roll D^{24} against the concaved surface $D^{23'}$ in the extension D^{23} , said roll D^{24} operating to hold the clamp D^{14} in the position shown. The set-screw D^{31} binds the upper and lower jaws of the clamp-piece D^{14} together and holds the needle D^{13} firmly in position.

As shown in Figs. 1, 2, and 3, the latch D^{17} is in position to engage the extension $D^{7'}$ on the needle-carrier D^7 on its movement forward. On the return stroke the extension D^{16}

is engaged by the needle-carrier D^7 , so that the two needles make one movement, operated by the usual mechanism (not shown) into and out of the shed in unison, both needles entering the same shed, as above described. In Fig. 3 more particularly is shown the means for releasing the latch D^{17} for the second insertion of the filling-thread, when the needle D^{12} goes forward as before, but the needle D^{13} remains stationary and is held in check by the check-roll D^{24} .

On the shaft B^2 is the cam B^3 , with a groove B^4 therein, in which travels the roll B^5 on the stud B^6 in the end of the lever B^7 , fast on a rod B^8 in a stand B^9 , secured to the loom-frame A. Fast to the rod B^8 is the upright lever B^{10} .

Through the rocking of the rod B^8 upon the rotation of the cam B^3 and the lever B^7 a forward movement is communicated to the lever B^{10} in the direction of arrow e , Fig. 3, and the set-screw B^{11} , mounted in the upper end of said lever, is adjusted to strike against the arm B^{21} of the latch D^{17} and raise it above the extension $D^{7'}$ on the carrier D^7 to an inoperative position. On the following forward movement of the carrier D^7 the needle D^{13} will remain stationary. The continued revolution of the cam B^3 through the lever B^7 moves back the lever B^{10} , carrying the set-screw B^{11} . The latch D^{17} , through the operation of the spring D^8 , assumes its lowest position, so that it may reengage the extension $D^{7'}$ when the carrier D^7 returns to its outermost position.

The ends of the needles are guided in the stands H, Figs. 1 and 2, and pivoted in the stand H is the lever H' , with the spring H^2 operating to hold the rolls H^3 (shown in dotted lines in Fig. 1) against the under side of the needles D^{12} and D^{13} . The stand H has the extension H^4 thereon, in which is fast the rod D^{15} , on which the needle-clamp D^{14} slides to carry the needle D^{13} in and out of the shed.

In Fig. 4 is shown a part of the shed-forming mechanism corresponding to what is shown in Fig. 11 of said Patent No. 668,597, with three cams formed to move the harnesses and open the sheds in the order required, as above described.

B^{12} , B^{13} , and B^{14} are the harness-frames, each of which has connected with it a rod 2, jointed to one of a series of levers 3, 4, and 5, pivoted at 6 on a stand 7, secured to a portion of the loom-frame A. Each lever has a suitable roller 8, (shown by dotted lines in Fig. 4,) which enters a cam-groove in a cam fast on the shaft B^2 . There is a cam for each lever 3, 4, and 5, which cams are lettered in the drawings, respectively, $B^{12'}$, $B^{13'}$, and $B^{14'}$, and each is properly shaped, as shown in detached views Figs. 10, 11, and 12, so that in the revolution of the shaft B^2 the cams will move the harnesses to form the required sheds.

In Fig. 5 is shown a detail of the mechanism for actuating the shuttle containing the weft-thread to lock the double filling. This mechanism corresponds with the mechanism

shown in Fig. 15 of United States Letters Patent No. 490,237, above referred to, except that there are two ways or tracks O O to guide the threaded end of the two needles instead of one way, as shown in said Fig. 15. In all other respects the construction and operation of the mechanism shown in Fig. 5 corresponds to the mechanism shown and described in said Fig. 15, and therefore does not require to be fully described herein.

We will briefly describe the mechanism shown in Fig. 5, using the same letters of reference as are used in Fig. 15 in said Patent No. 490,237.

Referring to Fig. 5, b^{28} represents the curved shuttle-race, in which is a reciprocating shuttle b^{29} , carrying the locking-thread for the weft-carrier needles. The shuttle b^{29} receives its reciprocating movement from a vibrating lever b^{70} , pivoted on a stud b^{71} on an arm b^{72} , forming a part of the shuttle-race. The lever b^{70} may be oscillated by any suitable device. The weft-locking thread, carried by the shuttle b^{29} , is extended through the loop-like eye w^{2x} on a lever w^{3x} , constituting a thread-controller, said lever turning about a vertical pivot w^{6x} , the said eye w^{2x} occupying its forward position toward the fell while the weft-carrying needle is being projected through the shed to leave a loop outside that selvage most distant from the starting-point of the said needle, said loop being caught by the locking-thread contained in the shuttle b^{29} , all as fully described in said Patent No. 490,237.

Having described the construction of the mechanism shown in the drawings, which may be used in carrying out our improvements, we will now briefly describe the formation of the sheds by the movement of the harnesses for the insertion of two weft carriers or needles to place double weft-threads on each side of the tuft-yarn carriers, as above described, and for the insertion of one weft carrier or needle to place one double weft-thread.

Referring to Figs. 4 and 10 to 16, inclusive, the cam marked $B^{12'}$ is for moving the harness B^{12} , carrying the warp-thread $B^{12'}$, the cam marked $B^{13'}$ is for moving the harness B^{13} and warp-thread $B^{13'}$, and the cam marked $B^{14'}$ is for moving the harness B^{14} and warp-thread $B^{14'}$. Said three cams are shown in Fig. 4 in position for forming the shed shown in Fig. 13 of the drawings, in which the harness B^{12} is in the upper plane of the shed and the harnesses B^{13} and B^{14} in the lower plane of the shed. The row of tuft-yarn carriers K, carrying the tuft-yarn L, are inserted into the shed through the warp-threads in the ordinary way—for example, as shown and described in said Patent No. 490,237. The needles D^{12} and D^{13} , carrying double picks of weft P, are then inserted through the shed, the needle D^{12} in front of the tuft-yarn carrier K and through or between the upturned ends of the tuft-yarn and the needle D^{13} back of

the tuft-yarn carrier, as shown in Fig. 13. The continued movement of the loom will withdraw the tuft-yarn carriers K, leaving the tuft-yarn around the pick of weft after it has been severed from the carrier by the ordinary mechanism, (not shown,) and the cam B^{14'} will move the harness B¹⁴ and carry the warp-thread B^{14''} into the upper plane of the shed, and at the same time the reed M on the lay (not shown) will advance with the lay to beat up the two picks of weft P and the tuft-yarns L to the fell of the fabric, as shown in Fig. 14. As the reed and lay recede to their backward position there will be a second shed formed, as shown in Fig. 14, into which the needle D¹² will enter, carrying one double pick of filling P, as shown in Fig. 14, the needle D¹³ remaining stationary. In the continued movement of the loom the forward movement of the reed and lay beats up the one double pick of weft P (shown in Fig. 14) to the fell of the fabric, as shown in Fig. 15. The three double picks act to hold one row of tuft-yarns in place, as shown in Figs. 13 to 16. The harnesses are again changed through the revolution of the cams B^{12'}, B^{13'}, and B^{14'}, and the warp-threads B^{12''} and B^{14''} are carried into the lower plane of the shed and the warp-threads B^{13''} into the upper plane of the shed, thus forming the sheds for the insertion of the tuft-yarn carriers K, as shown in Fig. 15, and the insertion of the two needles D¹² and D¹³, as before described in connection with the first position of the harnesses. (Shown in Fig. 13.) The harness B¹⁴ then moves to carry the warp-threads B^{14''} to the upper plane of the shed, as shown in Fig. 16, and the tuft-yarn carriers are withdrawn and the reed and lay moved forward to beat up the two double picks and the tuft-yarn to the fell of the fabric, as shown in Fig. 16. The reed and lay again moves back, forming the shed shown in Fig. 16, for the insertion of one double pick by the needle D¹², and the reed and lay move forward to beat up said double pick to the fell of the fabric, and the harnesses B¹³ and B¹⁴ are moved to carry the warp-threads B^{13''} and D^{14''} to the lower plane of the shed and the harness B¹² to carry the warp-threads B^{12''} to the upper plane of the shed, forming the shed shown in Fig. 13, and the operation above described is repeated.

It will be understood that the details of construction of the mechanism shown in the drawings may be varied, if desired.

We do not limit our invention to the movement of the harnesses and the formation of the sheds in the special manner herein described, as any other suitable movement of the harnesses for forming the sheds for the insertion of a plurality of weft-carriers in the same shed after the insertion of the tuft-yarn carriers in the same shed may be employed.

Instead of inserting the weft-threads on each side of the tuft-yarn carriers in the same shed, as above described, and shown in the

drawings, they may both be inserted on the same side—that is, one double pick in the loop of the tuft-yarn, as above described, and the other double pick in front of the loop of tuft-yarn or between it and the fell of the fabric. This will maintain the same number of weft-threads in the fabric and in the same positions, except that the double pick of weft which does not pass through the loop of yarn will be in the same shed in front of the loop of yarn or between it and the fell of the fabric instead of back of the loop of yarn.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a loom for weaving tufted fabrics, the combination with a filling-thread needle, and a second filling-thread needle extending parallel to the first-mentioned needle, of clutching mechanism for connecting the second-mentioned needle with the first-mentioned needle to cause it to be carried with it into the shed, and for disconnecting it therefrom so that it will remain stationary, substantially as shown and described.

2. In a loom for weaving tufted fabrics, the combination with a series of tuft-yarn carriers carrying tufting-yarns, and adapted to be carried or placed in the open shed, with the upturned ends of the tufting-yarn above the warps, and forming an open loop in the shed, between the free ends of the tufting-yarns and their carriers, of two weft-carriers provided with weft-threads, and means to actuate said carriers through the open shed, after the insertion of the tuft-yarn carriers, one weft-carrier passing through the open loop above mentioned, to place a weft-thread in said loop, and one weft-carrier passing one side of said loop, to place a weft-thread in the same shed outside of said loop, substantially as shown and described.

3. In a loom for weaving tufted fabrics, the combination with a series of tuft-yarn carriers, carrying tufting-yarns, and adapted to be carried or placed in the open shed with the upturned ends of the tufting-yarn above the warps and forming an open loop in the shed between the free ends of the tufting-yarns and their carriers, of two weft-carriers provided with weft-threads, and means to actuate said carriers through the open shed, one weft-carrier passing through the open loop above mentioned to place a weft-thread in said loop, and one weft-carrier passing one side of said loop to place a weft-thread in the same shed, outside said loop, and a reed to beat the weft-threads of both weft-carriers simultaneously to the fell of the fabric, substantially as shown and described.

4. In a loom for weaving tufted fabrics, the combination with means to form single sheds in the warps, and a series of tuft-yarn carriers carrying tufting-yarns and adapted to be carried into the shed, the free ends of the tufting-yarns extending above the warps and

forming an open loop in the shed, of two weft-carriers provided with weft-threads, and means to simultaneously actuate said weft-carriers through the open shed, after the insertion of the tufting-yarns, one carrier passing through the open loop above mentioned and placing a weft-thread in said loop, and the other weft-carrier passing one side of said loop, and placing a weft-thread in the same shed outside of said loop, substantially as shown and described.

5. In a loom for weaving tufted fabrics, means to form sheds, a series of tuft-yarn carriers carrying tufting-yarn and adapted to be placed in the open shed before the insertion of the weft-carriers, two weft-carriers, and means to actuate them, to place weft-threads in the open shed, and guideways for each weft-carrier to retain the ends of said carrier in proper relation with the shuttle as it passes through the loops of weft-threads, and a selvage-thread shuttle, actuated to pass through

the loops of the weft-threads, substantially as shown and described.

6. A loom for weaving tufted fabrics, provided with tuft-yarn carriers, carrying tufting-yarn and adapted to be placed in the open shed before the insertion of the weft-carriers, with the upturned ends of the tufting-yarn extending above the warps and forming open loops, two weft-carriers, and means to actuate them through the open shed and place one double weft-thread in the loop of the tuft-yarns, and one double weft-thread one side of the tuft-yarns, and means to beat the tuft-yarns and both weft-threads simultaneously to the fell of the fabric, substantially as shown and described.

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