

No. 668,597.

Patented Feb. 19, 1901.

H. WYMAN.

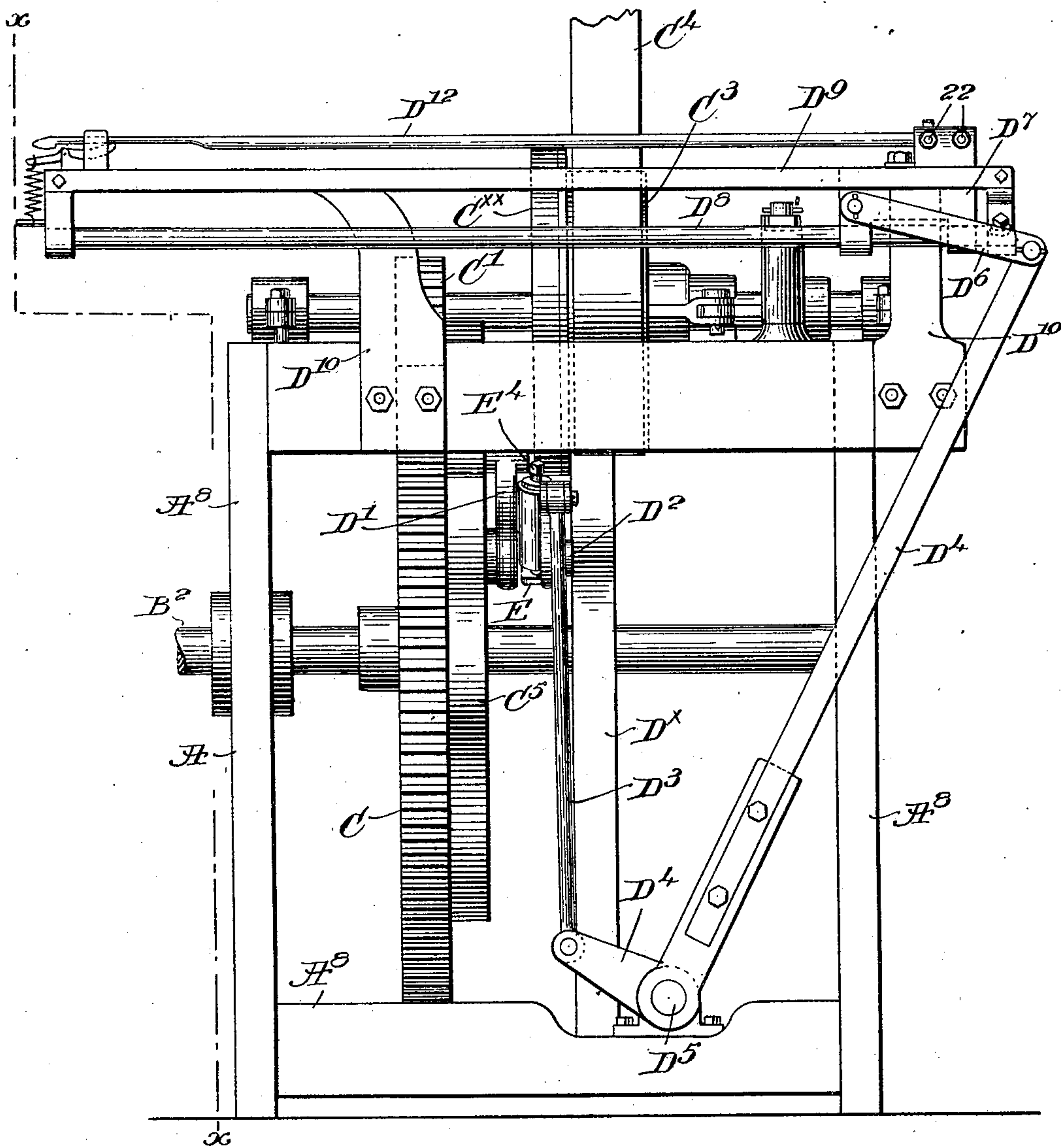
LOOM FOR WEAVING TUFTED FABRICS.

(Application filed Mar. 12, 1900.)

(No Model.)

7 Sheets—Sheet 1.

Fig: 1.



WITNESSES.

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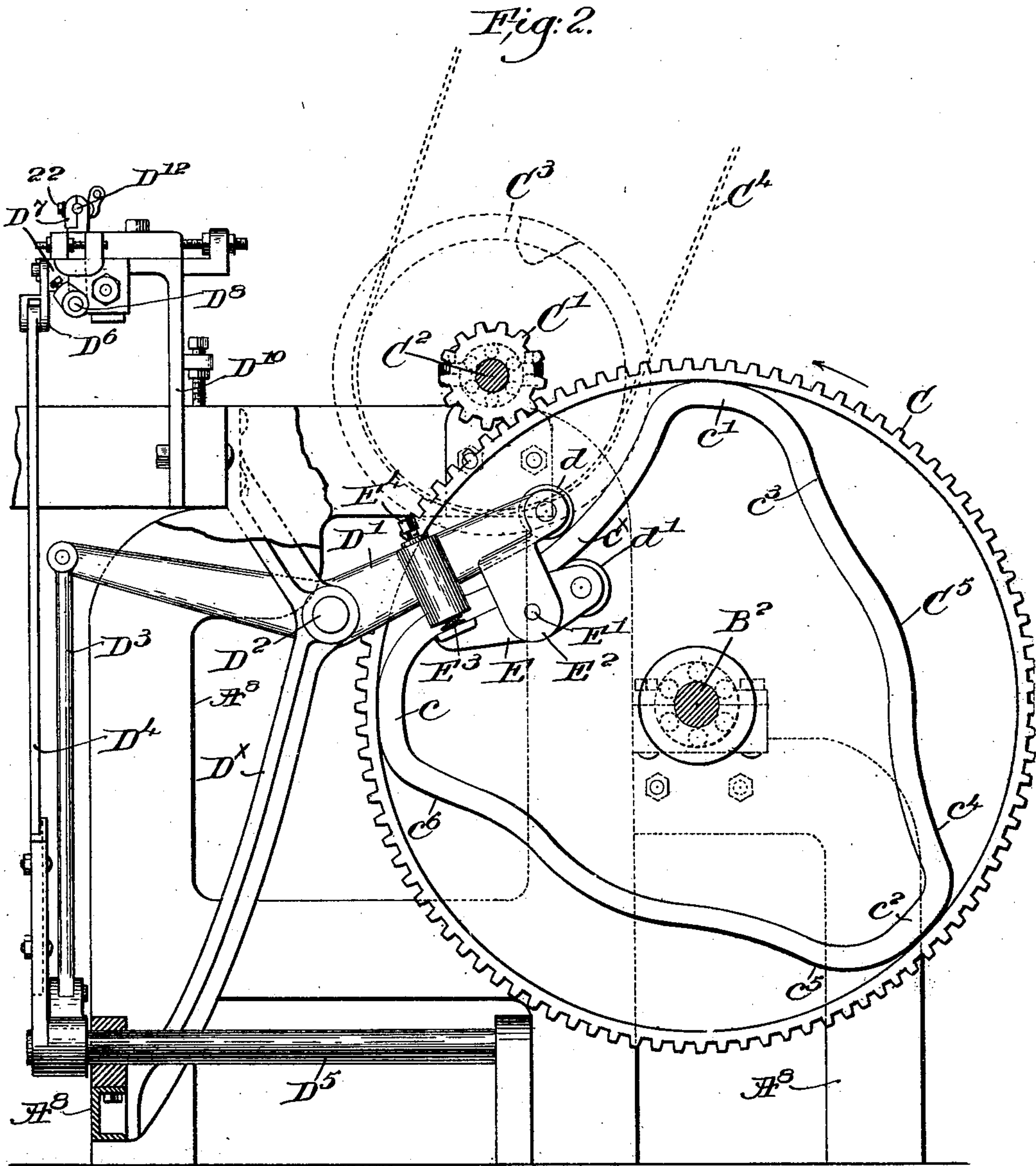
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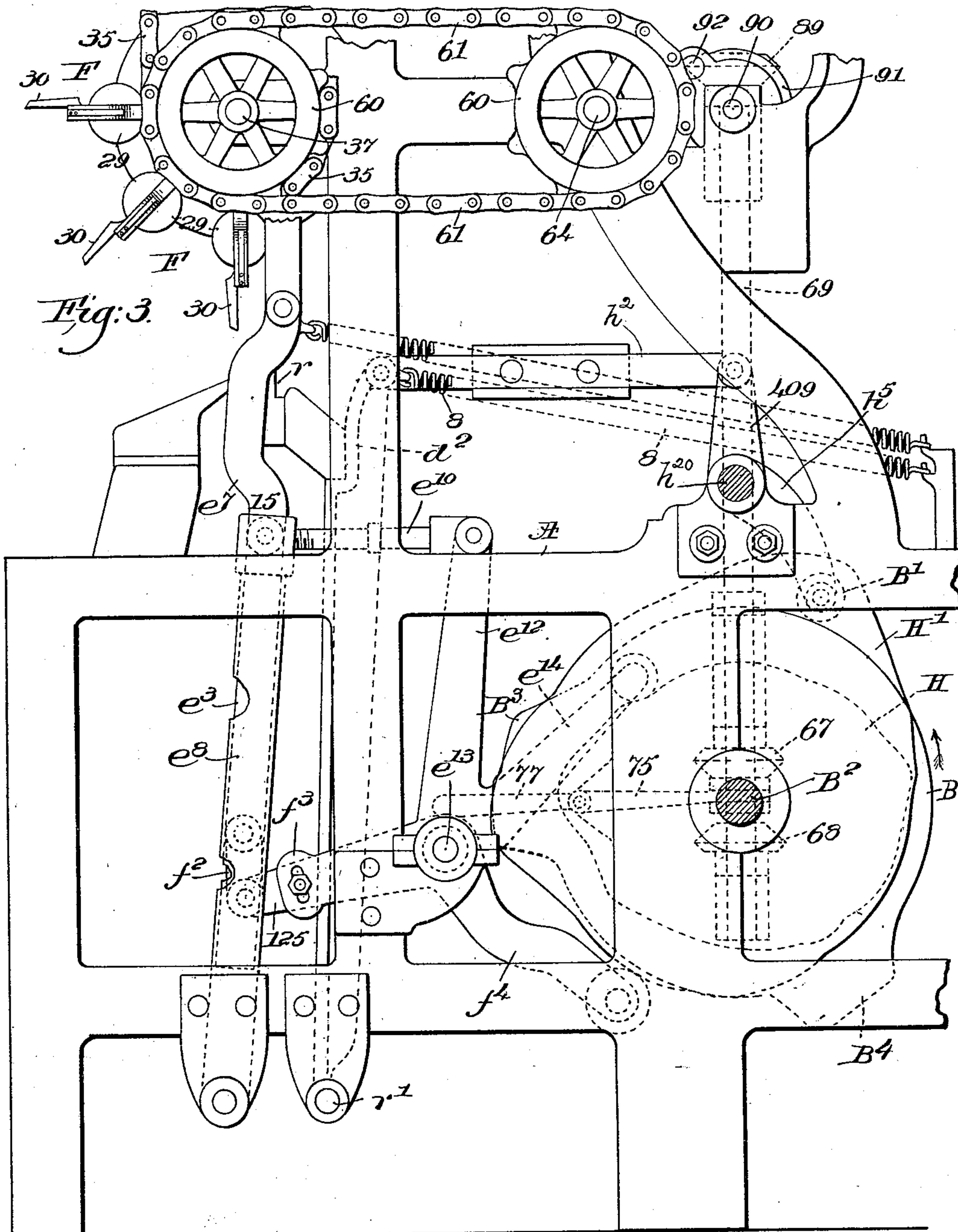
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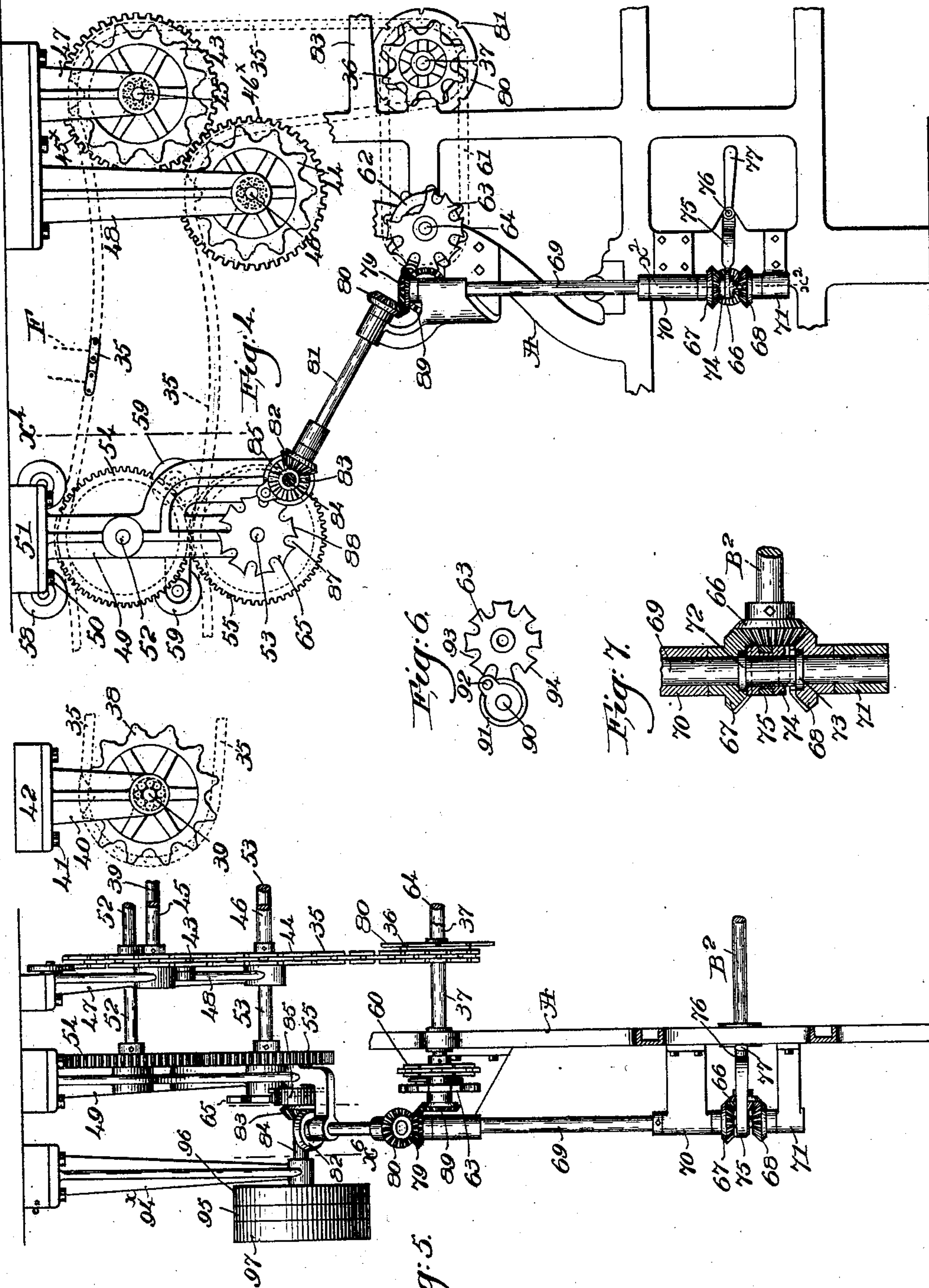
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7 Sheets—Sheet 4.



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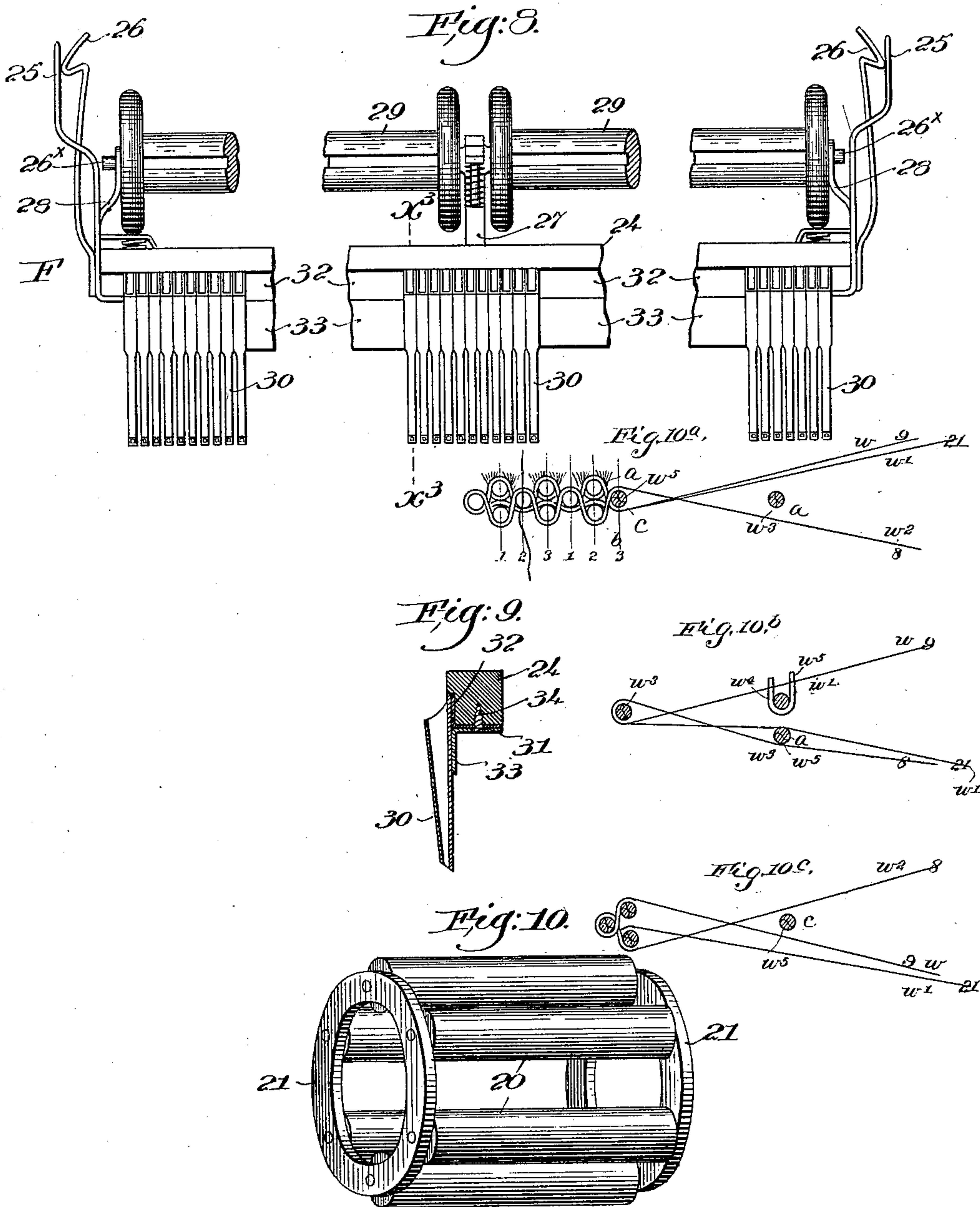
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Fig. 11.

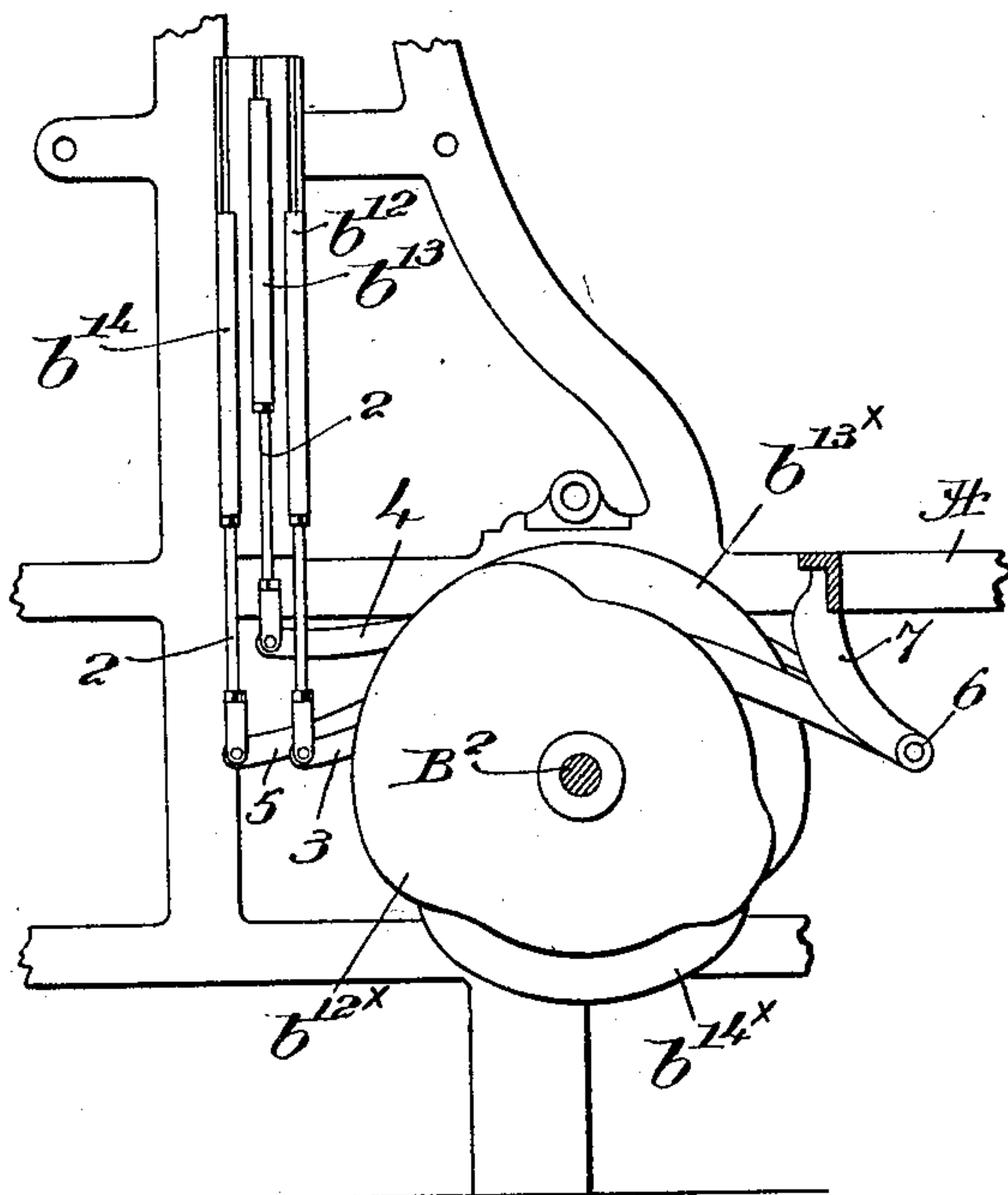


Fig. 12.

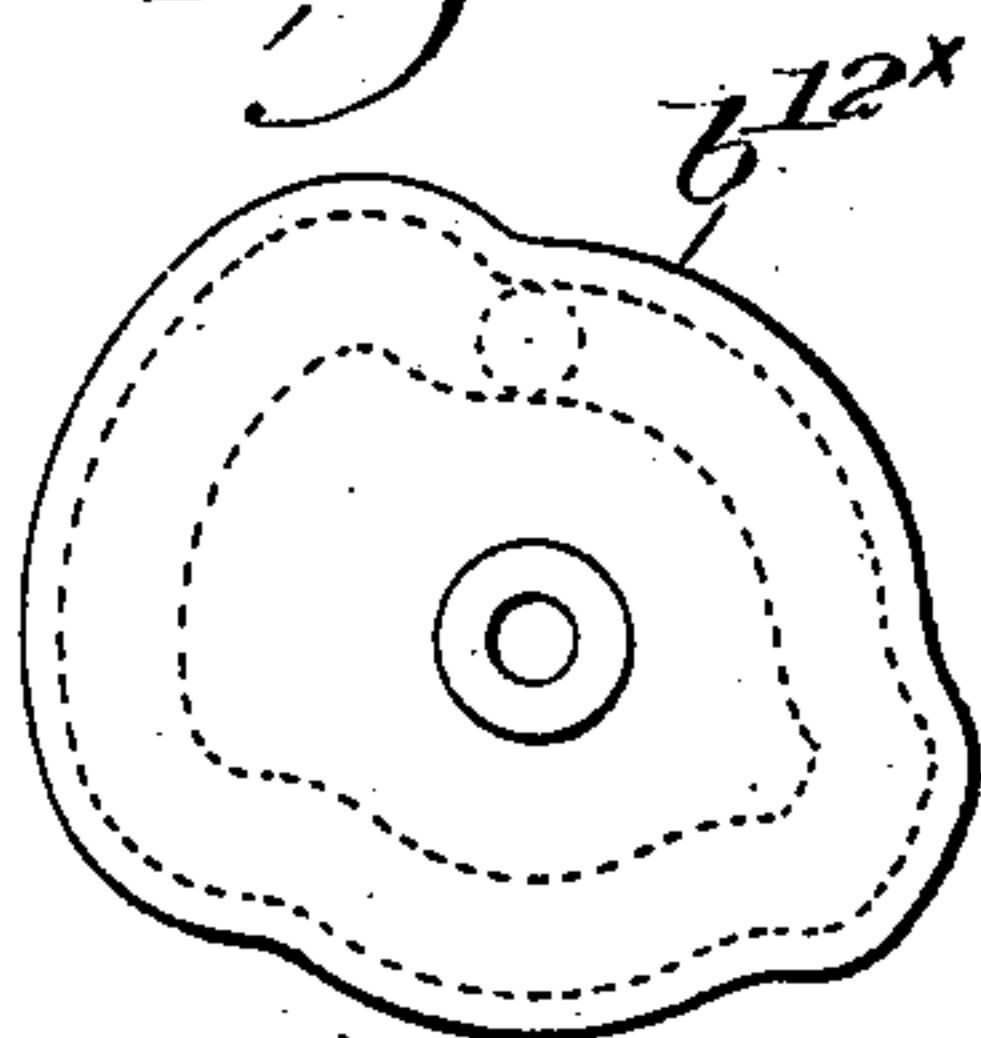


Fig. 13.

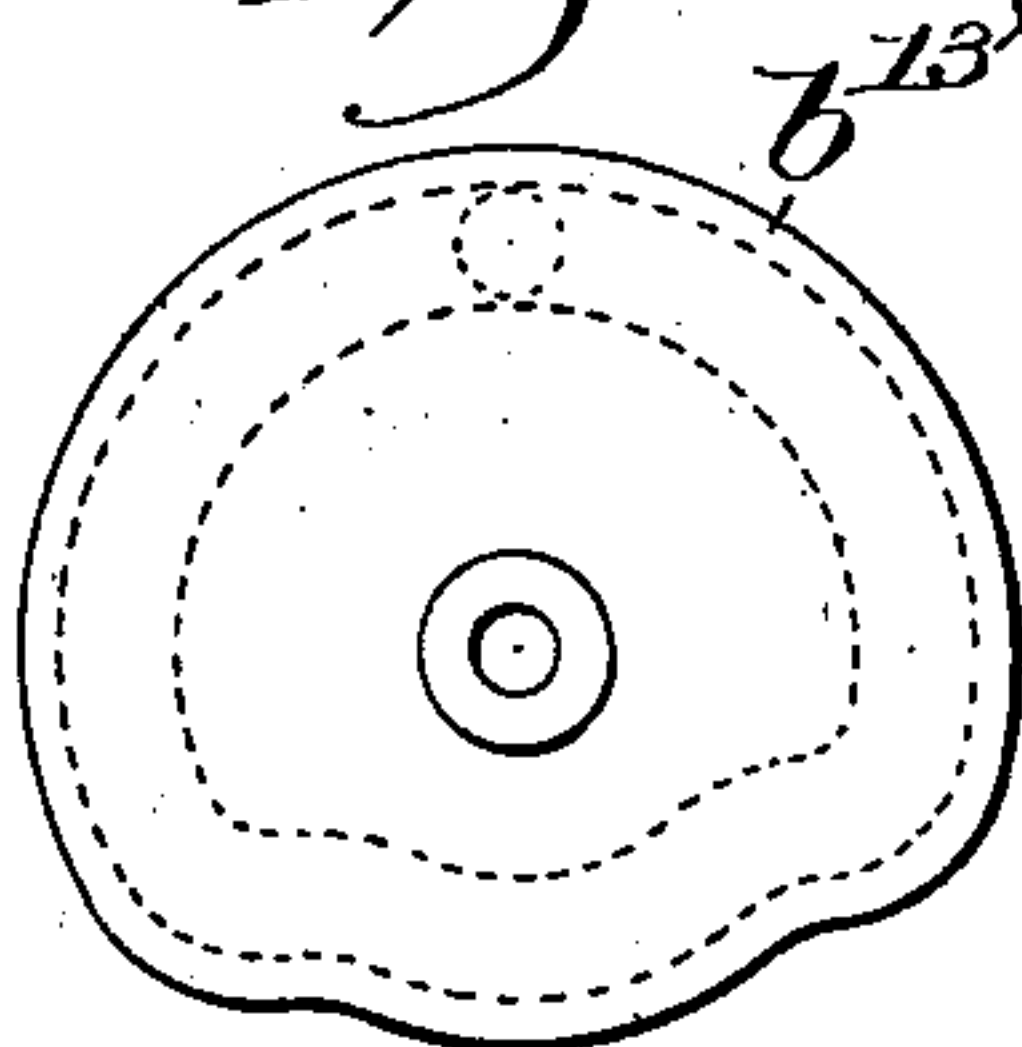


Fig. 14.

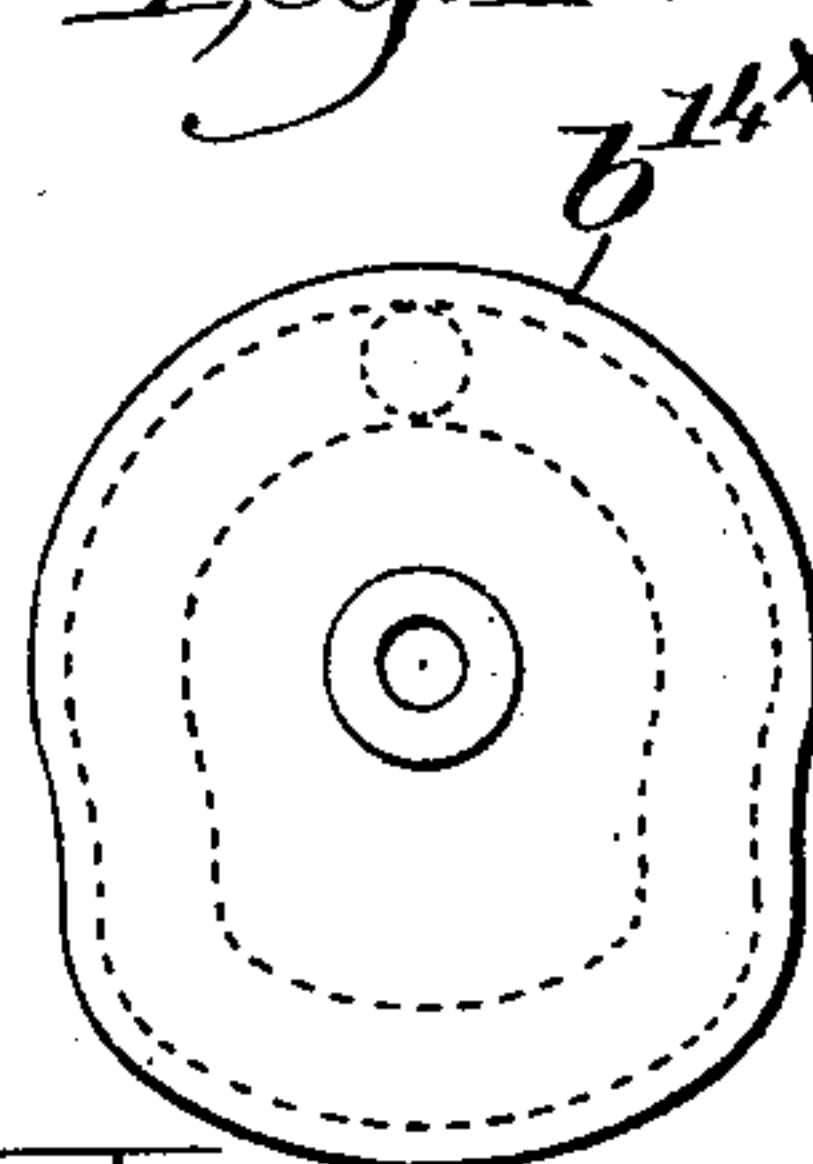
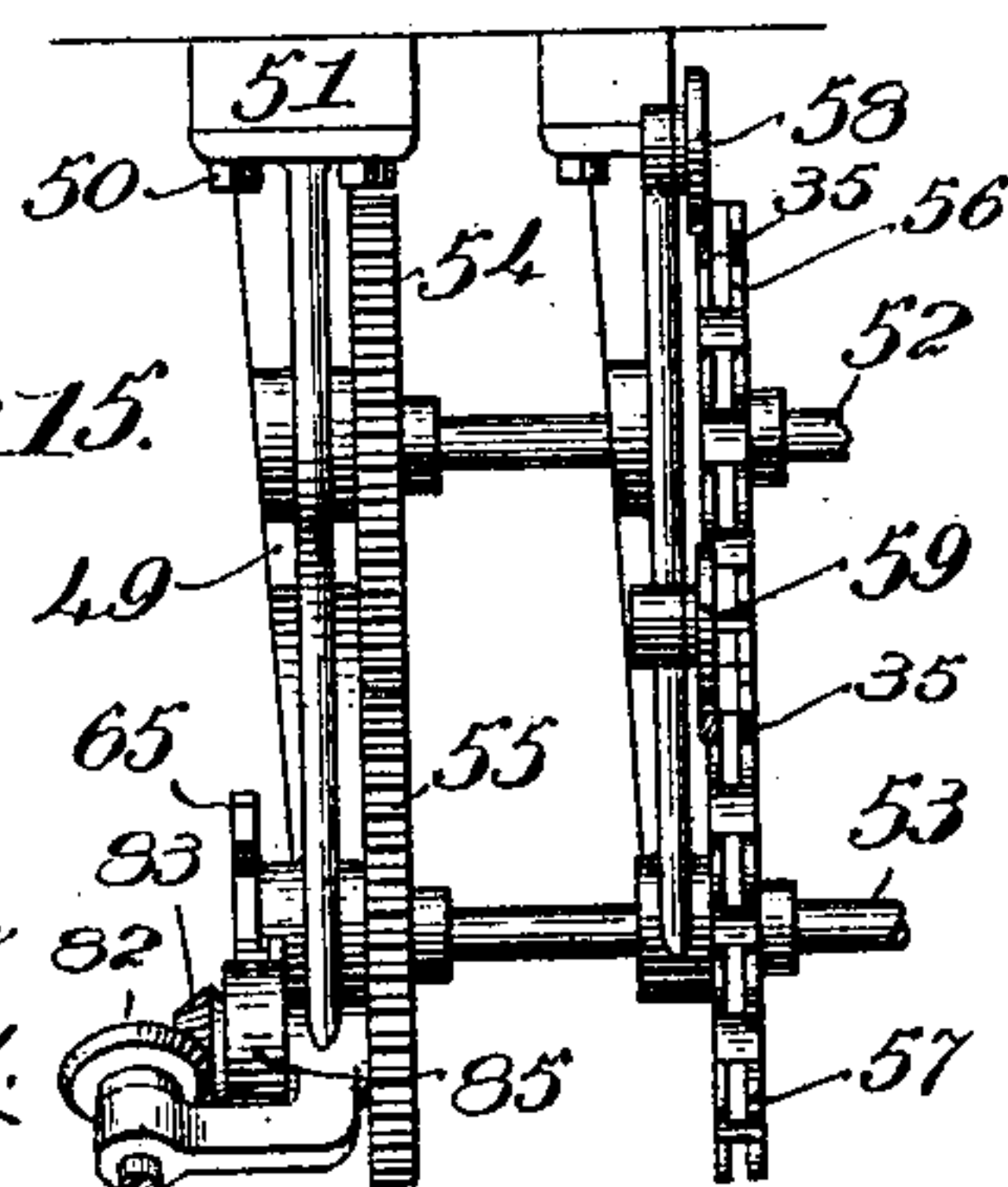
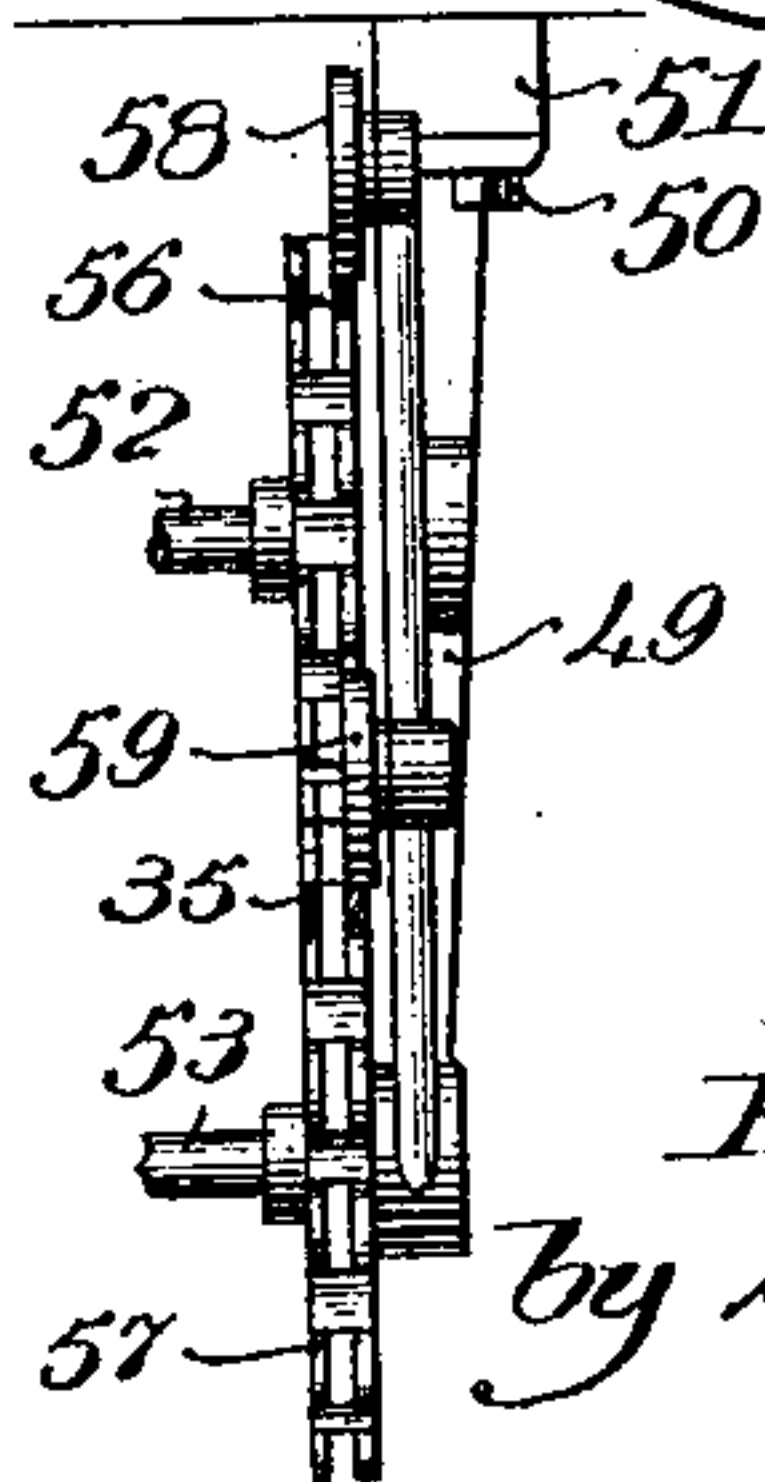


Fig. 15.



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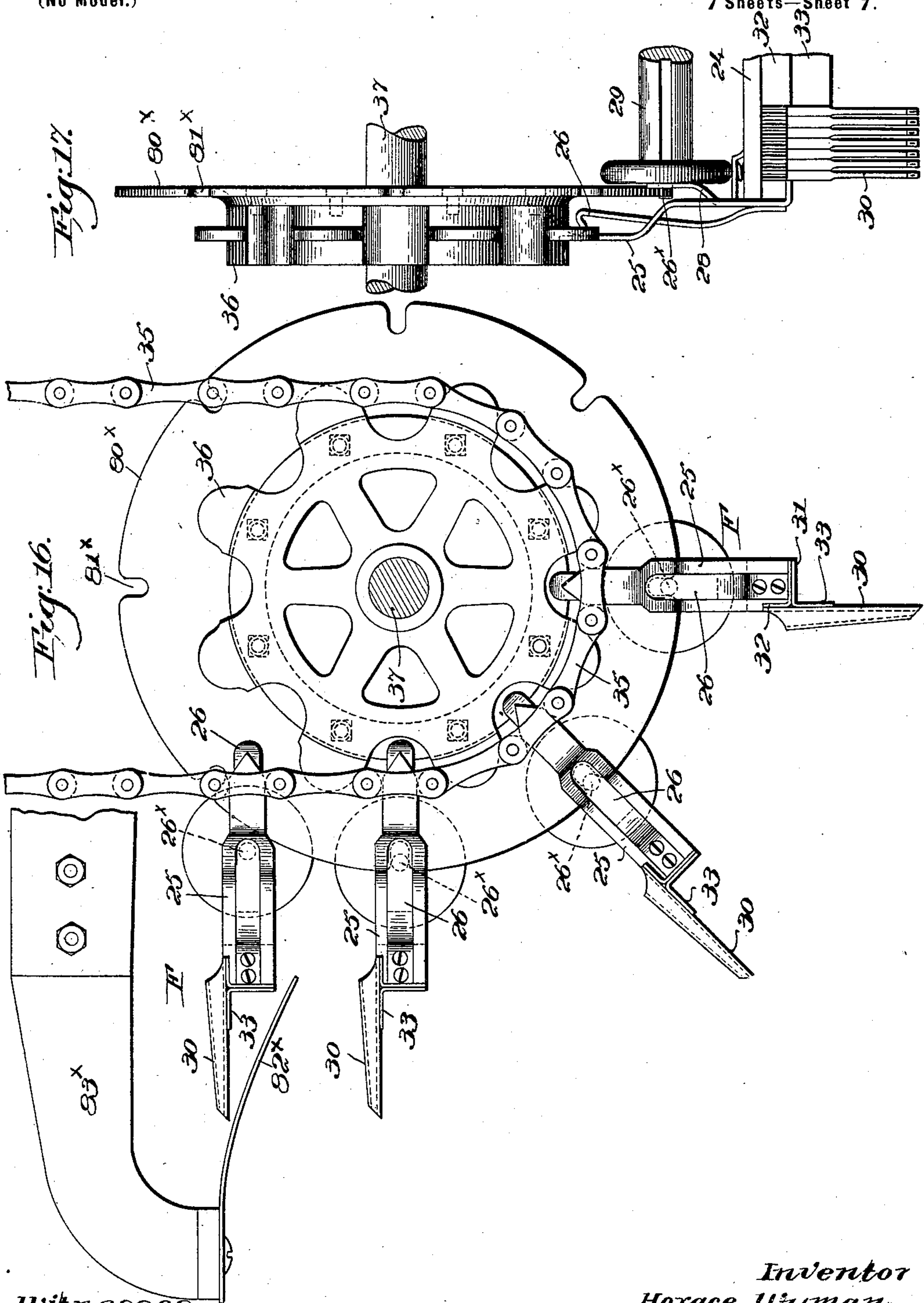
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UNITED STATES PATENT OFFICE.

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LOOM FOR WEAVING TUFTED FABRICS.

SPECIFICATION forming part of Letters Patent No. 668,597, dated February 19, 1901.

Application filed March 12, 1900. Serial No. 8,270. (No model.)

To all whom it may concern:

Be it known that I, HORACE WYMAN, a citizen of the United States, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented an Improvement in Looms for Weaving Tufted Fabrics, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to looms for weaving tufted fabrics, and relates more especially to the so-called "needle" and "lay" motions, they being organized and operated in a novel manner and time to enable the production of a larger amount of fabric in a given time, the machine being run at a certain speed; and the invention also comprehends improvements in the mechanism for operating the spool-frames and also in the frames themselves. In looms of this class the weft is customarily inserted in the open shed from one side thereof by a needle, and the weft, laid in the shed double or in the form of a loop, is entered at the side opposite that at which it was inserted by a selvage-thread which may be carried by a shuttle, and the needle is then retracted from the shed and held stationary, while the lay comes forward and beats the weft up to the fell, and the lay is retracted, a second shed is opened in the warp in front of the reed, the tuft-yarns, held in suitable guides of a spool-frame, are preferably presented in the shed then open, so that the free ends of said yarns are left above the warp, and the weft-controlling needle is then operated to lay a weft in said shed, it preferably crossing or holding the tuft-yarns in the usual manner, and the needle is retracted and held stationary while the lay is moved forward a second time to beat in the second weft, this second pick of weft beat into the fell taking with it the tuft-yarns, which are cut off in usual manner, leaving tufts in the fabric, after which the lay is again retracted and another or third shed is formed in which the needle again lays a third weft and retires, and the lay is again moved for the third time to beat in the third weft-crossing and bind the tufts into the fabric, the lay then retiring and a shed being opened corresponding with the first shed, here-

inbefore named, preparatory to again repeating the operation described, the insertion of the third pick completing the cycle of operations, each cycle including three complete movements of the needle while the lay is at rest and three complete movements of the lay while the needle is at rest, there being a shed for each needle action, the fabric made being that represented in United States Patent No. 245,259, dated August 2, 1881, with the exception that in said patent each pick of weft is represented as composed of four threads, whereas in the present instance each pick is composed of but two threads, the pick being a double pick.

I have found by experiment that I may run the loom herein to be described and produce a greater amount of fabric of standard quality than can be produced on looms as now organized for this work, and I have effected this larger production of work by increasing the speed of the loom and by inserting the first pick of the cycle of weaving movements and the tuft-holding pick each in rapid succession in its own shed while the lay is held in its inoperative position, the lay being moved after the insertion of two double picks to beat said two picks at one operation, one pick holding the tufts into their proper position in the woven fabric and the third or last pick of the cycle being inserted and beat in in usual manner. To enable this increased production of fabric, I have devised means for actuating the weft-inserting needle in rapid succession to thereby lay the weft in two sheds formed in rapid succession by usual harness mechanism or frames, one shed immediately after the other, the lay remaining at rest and away from the fell while the first two picks of the cycle of weaving are being inserted, the lay acting first in each cycle only after the second or tuft-yarn-holding pick is made, it beating in said second and the previous laid pick. I have also devised new means for imparting a variable movement to the lay, it being actuated in a novel time and order with relation to the needle mechanism, or, in other words, I utilize one beat of the lay to beat up two picks of weft inserted in succession in two sheds made one following the other rapidly. I have also provided means whereby

the harness mechanism employed to form sheds is actuated rapidly to form two sheds, one immediately after the other while the lay is at rest, said sheds being formed one following the other with a shorter interval of time than the time between the second and third sheds, the latter requiring a much longer time, because of the fact that the lay is then actuated to beat in at one operation the first and second picks preparatory to making a third shed. The lay occupies its backward position and remains there while the needle controlling the weft inserts two successive picks of double weft in the two sheds, the lay then being moved to beat into the fell said two picks and when the lay retires again and remains in its backward position while another pick is inserted in a third shed, when it is immediately again moved forward to beat in that pick to the fell, it again retiring and remaining in its backward position while two other picks are inserted.

I have described the cycle of movements as being repeated with each three picks, that number of picks binding in a row of tuft-yarns; but the cycle may include a greater number of picks in securing the tuft-yarns in the fabric, so long as there shall be at times a pick inserted in two sheds made one after the other in rapid succession without an action of the lay, or, in other words, so long as the lay is held at rest at times and made to beat into the fell two successive picks, each in its own shed, rather than beating each pick immediately after it has been laid into its own shed. So, also, in this class of looms the tuft-yarn is wound on a series of spools mounted in spool-frames detachably connected with an endless chain, and when a row of tufts is to be put into the fabric one of these frames is taken from the chain by transferring mechanism, which presents the tubes containing the tuft-yarns into the warp, said yarns being interwoven therewith and thereafter severed between the warp and the spool-frame to form tufts, the spool-frame being then returned to the chain by the upward movement of the transferrer, it leaving the frame in the chain and immediately thereafter the relative positions of the transferrer and spool-frame is changed, so that the transferrer in its next operative movement will engage and detach from the chain the next spool-frame of the chain following the one last removed. The chain remains stationary while the spool-frame is detached to supply tuft-yarns to the warp and is returned into its position in the chain, the chains being advanced step by step commonly for the distance of one spool-frame from the next frame in the chain that a fresh spool may be taken by the transferrer at each operation.

In practice with carrying-chains containing a large number of spools it has been found that when the chains are advanced by moving the shaft employed to actuate the chain, such movement being effected by a pawl-and-

ratchet motion, the resistance offered by the chain in moving is so great that sometimes the shaft fails to be turned for just the proper distance to put in its proper operative position the frame next to be taken from the chain by the transferrer, and consequently the frames fail to register properly with the transferrer, and the transferrer is therefore rendered inoperative and fails to take a frame from the chain. To overcome this difficulty, I have provided main and secondary chain-actuating means, each being moved intermittently at suitable times by devices acting substantially in unison for the whole or a portion of the time to thus move the chain intermittently step by step. The secondary chain-driving means coöperates with and starts what I shall designate the "registering-shaft," it directly engaging that part of the chain from which the spool-frames are taken and returned, said registering-shaft insuring the accurate positioning of the spool-frames to be taken by the transferring means. The main actuating means for the chains move the same intermittently from a position of rest, and, as herein shown, the chains are engaged positively both in the upper and lower run thereof, said main actuating means doing the chief amount of work in overcoming the weight of the chain in moving it step by step, the secondary means aiding in starting the chain in motion and insuring that that particular part of the chain from which is to be taken the spool-frame to be used shall be accurately and unerringly moved to insure the proper position for a spool-frame to be taken from and returned to the chain.

The chain when applied in the loom is provided in both runs to the right of the main actuating means for the chain with a defined amount of slack, and the registering-shaft acts in the turn of the chain or the part of the chain from which the spool-frames are taken, and owing to this slack chain the registering-shaft may easily start the chain, the main actuating means acting thereafter to move the bulk of the weight of the chain. The main and secondary chain-moving means may be driven at the same speed or one may be driven at a relatively different speed, so that one will start before the other. The main and secondary chain-moving means are both driven intermittently from a suitable continuously-moving shaft.

I employ an auxiliary chain as a secondary chain-moving means, it turning the registering-shaft.

It is desirable at times to move the carrier-chain while the loom is at rest, and heretofore this has been done by the operator through a lever which, moved by hand, actuated the chain step by step; but when a large number of spool-frames are employed, as in long patterns, and especially in looms for weaving wide fabrics, the movement of the chain by hand requires very considerable labor on the part of the operator. So I have

devised means whereby when it is desired to move the chains other than in their regular operation I may disconnect a shaft, herein employed as the driving means for the chains during the regular operation of the loom in weaving, and throw into operation an independent auxiliary driving mechanism. I have also devised a new spool-frame, my aim being to provide a spool-frame having great strength and presenting the minimum of weight, said frame sustaining a plurality of spools end to end.

Referring to the drawings, Figure 1 represents a partial front elevation of the right-hand side of a loom embodying my present improvement, the figure showing only the mechanism for actuating the needle, part of the figure being broken out to save space upon the drawings. Fig. 2 is a right-hand broken end view of only the needle-actuating mechanism represented in Fig. 1, the chains, the transferring means, the lay, and their actuating mechanisms being omitted to avoid confusion in the drawings. Fig. 3 represents a partial right-hand side elevation, parts being in section, it showing chiefly the auxiliary chain for starting the spool-frame shaft, the transferring mechanism, and the lay, other parts of the loom shown in Figs. 1 and 2 being omitted. Fig. 4 is a detail looking at the loom from its left-hand end, it showing the run of spool-carrying chain chiefly by dotted lines and actuating means therefor, the figure showing but two spool-frames. Fig. 5 is a view of Fig. 4 looking at it from the right. Fig. 6 is a detail of the device for imparting intermitting motions to shafts, to be described. Fig. 7 is a sectional detail of the clutch mechanism in the line x^2 , Fig. 4. Fig. 8 is a detail showing one of the spool-frames provided with a plurality of spools, the frames and spools being broken out to save space upon the drawings. Fig. 9 is a section of Fig. 8 in the line x^3 . Fig. 10 shows one form of roller-bearing detached. Figs. 10^a, 10^b, and 10^c are details showing the disposition of threads in the formation of the fabric. Fig. 11 shows part of usual shed-forming mechanism with cams adapted to open the sheds in the order required for the practice of my invention. Figs. 12, 13, and 14 show in detail the shed-forming cams, to be described. Fig. 15 is a detail, broken out centrally, showing the shafts 52 and 53 and their sprocket-wheels 56 and 57 for engaging both runs of the chain, said sprocket-wheels forming part of the main chain-actuating means. Fig. 16 is an enlarged detail of the sprocket-wheel coacting with the part of the chain from which the spool-frames are taken to be used and the spool-frame-positioning device. Fig. 17 is an edge view of said sprocket-wheel, the chain being omitted, showing also the spool-frame-positioning device co-operating with a part of the spool-frame.

The framework A, the shaft B², the arm e^{14} , connected to the rock-shaft e^{13} , the extended

arms e^{12} , connected with the link e^{10} , attached to and imparting backward-and-forward movement to the guide-lever e^8 , the slide e^3 , fitted in said guide-lever and having jointed to it by a link f^2 , carried by the end of a lever 125, adjustably connected by link f^3 to said slide and connected with a shaft having an extended arm f^4 , provided with a suitable roller or other stud, are substantially the same as in United States Patent No. 446,402, dated February 10, 1891, and No. 490,237, dated January 17, 1893, and said devices constitute one form of usual transferring mechanism to engage the spool-frames, take them from carrying-chains, to be described, put the tubes of said frames into the warps to thereby put into position the tuft-yarns carried thereby. The lever h^5 , mounted on a rock-shaft h^{20} , said rock-shaft having arms 409, connected by a link h^2 with the lay d^2 , having dents r , said lay being pivoted at r' , are and may be all substantially as represented in said patents.

The shaft B² and harness-frames b^{12} b^{13} b^{14} are substantially the same as represented by like letters in United States Patent No. 245,259, dated August 2, 1881; but herein they are actuated in the production of a fabric such as shown in said patent by means which I will now describe. Each frame has connected with it a like rod 2, jointed to one of a series of levers 3 4 5, pivoted at 6 in a stand 7, sustained by the loom-frame A, each lever having a suitable roller-stud, (shown by dotted lines, Figs. 12, 13, and 14,) the stud of lever 3, connected with frame b^{12} , entering a cam-groove, the shape of which is shown by dotted lines, Fig. 12, in a cam b^{12x} , the cams b^{13x} and b^{14x} for actuating said frames b^{13} b^{14} being shaped as indicated by dotted lines in said figures, said cams in their operation acting to form sheds in irregular order.

Before entering into a detailed description of the operative parts I will first refer to the fabric in Figs. 10^a, 10^b, and 10^c. The drawings referred to show the warp-threads w , w' , and w^2 , a binding-weft w^5 , a weft w^3 , and a tuft-holding weft w^4 , holding tufts w^{5x} . Fig. 10^a shows some of the completed fabric, the weft w^5 being considered as the last one laid in the cycle of operation of weaving in Fig. 10^a. The warps w and w' are lifted and the pick of weft w^3 is inserted in a shed formed between the warps w and w' and the warp w^2 and then w' is lowered, forming a shed in which is inserted the usual tuft-yarn tubes 30, and then the weft w^4 is inserted in said shed to cross the tuft-yarns and the tubes are raised in usual manner and at the proper times to bend the tuft-yarns about the weft w^4 , and thereafter at suitable times the tuft-yarn is cut, leaving tufts or loops w^{5x} about the weft w^4 , and the two picks w^3 and w^4 are beat at one operation into the fell and the third shed is formed, this time, however, by lowering w next to w' and lifting w^2 , thus making the third shed, in which is inserted the weft w^5 .

From the foregoing it will be understood

that the machine to be described forms a plurality of sheds while the lay is maintained on its back stroke, one of said sheds receiving a pick of weft which appears at the back of the fabric and the other pick of weft, which is embraced by the tuft-yarns, and said two picks inserted in the sheds and one of them embraced by the tuft-yarns, and the threads having been preferably crossed for the third shed are beat up by the lay to the fell. During the operation of the reed the needle or weft carrier is retracted and kept outside of the shed. Preferably during this beat of the lay the third shed will be completed for the reception of the third weft, which constitutes the binding-weft for the fabric. Herein the movement of the harness mechanism in the formation of the sheds is so timed as to form a longer dwell between the second and third sheds than between the first and second sheds, and so also in the operation of the needle or weft carrier or whatever weft-inserting means is employed there is a longer dwell between the second and third picks than between the first and second picks, or, in other words, two of the three sheds completing the cycle of manufacture of the fabric described are made one immediately after the other and following quickly the insertion and withdrawal of the needle to be described, while the third shed is made after the lapse of a longer interval of the time of the loom than that between the first and second sheds. The third pick inserted in the third shed is beat up alongside of the two picks previously inserted, it acting as a binding-pick and separating successive picks holding the tuft-yarns and acting in holding the said tuft-yarn picks seated on picks under them.

The shaft B^2 in the invention to be herein described and claimed has a cam B, the shape of which is shown in Fig. 3, which acts against a roller B' , connected with the arm h^5 , and imparts to the lay its movements to beat in the weft or picks into the shed, said cam having, as herein represented, two throw-points B^3 B^4 , contained substantially within one hundred and eighty degrees of the cycle of the cam, so that said lay is retained in its backward position by a suitable spring 8 for substantially half of the rotation of said cam, the two throw-points B^3 and B^4 moving the lay forward twice in succession during substantially one-half the time of the cam in completing one rotation, the throw-point B^3 moving the lay forward immediately after the withdrawal of the needle from the second shed in the cycle of operation of the machine in weaving the fabric, the longer space between the throw-points B^3 and B^4 being utilized to enable a shed to be formed and a third pick or weft-crossing to be inserted into a third shed preparatory to the action of the throw-point B^3 in again moving the lay forward to beat in the third pick. While the part of the cam B between the throw-points B^3 and B^4 in the rotation of said cam in the direction

of the arrow thereon, Fig. 3, is in contact with the roller B' two sheds are formed in the warp, one quickly following the other, the two sheds being open only long enough to enable two movements of the filling-carrier, one after the other, to be made effective in inserting two picks of filling by inserting and withdrawing the carrier, the first pick not being beat by the reed of the lay into the fell of the cloth.

The transferring mechanism, comprising the means hereinbefore designated by that term and common to said United States Patents Nos. 446,402 and 490,237, in order that it may be moved to cooperate properly with the lay, the shed-forming mechanism, and the weft-carrying mechanism, must have imparted to it one complete forward and backward movement to each rotation of the shaft B^2 , and to do this said shaft has been provided with a cam H, the shape of which is represented by dotted outline in Fig. 4, it acting on a roller carried by the arm e^{14} . Rising-and-falling movement is given to a part of said transferring mechanism to engage a spool, take it from the chain, put the spool back into the chain, and leave it there by a cam H' of the shape designated by full and dotted lines in Fig. 3, it acting upon the lever carried by the arm f^4 , before described. Movement is imparted to the transferring mechanism by these two cams H and H' , their shape being such as to cooperate as to the time of their movements with the operation of the weft-inserting mechanism and lay, as herein described.

The shaft B^2 is provided with a toothed wheel C, which is engaged by a pinion C' on a power-shaft C^2 , having a suitable belt-pulley C^3 , of the friction order, it receiving a belt C^4 , said pulley cooperating with a mating friction-pulley C^{x4} , fast on said shaft, the rotation of the power-shaft rotating the gear C and the cam-shaft B^2 to operate the mechanism for weaving.

The shafts B^2 and C^2 are embraced in their bearings by antifriction-roller bearings composed of a series of bearing-rollers 20, mounted loosely in a suitable cage 21. One of these roller-bearings is represented as detached in Fig. 10.

The wheel C is represented as provided at one face with a cam-ledge C^5 , the opposite side of which is acted upon by suitable rollers d d' , the roller d being mounted upon a lever D' , mounted on a stud D^2 , held in an upright or brace D^x , the outer end of said lever having jointed to it a link D^3 , in turn jointed to the short arm of a lever D^4 , mounted on a rock-shaft D^5 , suitably sustained in the auxiliary frame A^8 , the upper end of said lever having jointed to it a link D^6 , which in turn is jointed to a carriage D^7 , mounted upon a suitable guide-rod D^8 , held in a guiding-frame D^9 , supported by brackets D^{10} , bolted to the framework A^8 of the machine, said carriage at a point above said guideway having

connected with it, by suitable screws 22, a suitable needle D^{12} , adapted to insert filling double into the shed made in the foundation-warps, constituting the back or foundation of the fabric to be woven, the movement of said lever D^4 by said cam-ledge during each rotation of the wheel C causing the needle to be projected into and to be withdrawn three times, as herein provided for, each complete forward-and-backward movement of the needle leaving in the shed a double filling, the said filling at one edge of the woven fabric being locked by a suitable selvage-thread passed through it. It may be as provided for in United States Patent No. 490,237, dated January 17, 1893.

The roller d' is carried by a lever E, pivoted at E' upon an ear E^2 , extended from the lever D' , said lever E being acted upon by a suitable spring E^3 , the tension of which may be adjusted as desired by or through a set-screw E^4 to thereby cause the rollers d and d' to hug closely, but yieldingly, the opposite sides of the cam-rib C^5 . This cam-rib (represented in Fig. 2) is of peculiar construction—that is, it has three throw-points c c' c^2 for inserting the needle in the shed, the throw-points c and c' being closer together than either the points c' and c^2 or c^2 and c . The high points c and c' are distant one from the other only sufficient to enable the needle moved by the high point c to be retracted from the shed while a new shed is being made, the throw-point c' immediately actuating the needle again and inserting it into the second of the three sheds necessary, as my invention is herein represented, to be made in one cycle of operation of the loom. The second shed is made while the depressed part c^x of the cam-rib C^5 , moving in the direction of the arrow, Fig. 2, between the points c c' , is embraced by the rollers d and d' , the part c^3 of the said cam-rib retracting the needle from the second shed, the distance along the cam-rib between the throw-points c' and c^2 being sufficient to afford time in which a third shed may be made, and while the needle is held at rest outside the shed to enable the lay to be moved forward and beat toward the fell the two double picks of filling previously inserted in two successive sheds previously formed. After the lay has been moved forward by the point B^3 of the cam B to cause the reed r to beat in the two picks w^3 and w^4 of filling, the pick w^4 having the tuft-yarns W^x laid about it, the third shed is opened, so that by the time that the portion c^4 of the cam-ledge comes into operative position the needle is again thrust into the shed with its weft w^5 , it completing its movement through the shed as the high point c^2 comes between the rollers d d' , it being retracted as the part c^5 of the cam comes into operative position between the rollers d and d' , and between the point c^5 and the point c^6 , forming part of the high point c , said third pick of weft w^5 is laid and beat into the third shed. The lay is

moved forward to beat in the third pick w^5 of filling by the part of the cam-rib c^5 c^6 , it then coming between the rollers d and d' , and the harness-frames are then operated to open the shed to again receive the needle, which is thrust through the shed as the high point c acts. As herein represented, these three picks are repeated in the order stated in the production of one row of tufts, the said three picks, three sheds, and two beats of the lay completing the cycle of operation of setting a row of tufts.

Prior to this invention it has been customary to beat into the fell each pick immediately after the same has been laid in the shed and very considerable time of the loom is wasted, the filling-carrier standing still during the time that the lay is moved to beat in each filling.

I find that I may produce a fabric of good quality, not at all inferior to that heretofore made on this class of loom, by omitting one beat of the lay from the cycle of usual operation—that is, I introduce two picks of filling successively in two sheds and beat these two picks up to the fell in one forward movement of the lay, such beat forcing the second pick surrounded by the tufts forward to the fell and seating said tufts on the first pick, as represented in said Patent No. 245,259. It will, however, be understood that my invention is applicable in weaving any tufted fabric, whether the cycle for each row of tufts is completed by the insertion of three picks or more, so long as I so construct the needle-operating cam that it may insert two picks of filling in two successive sheds followed by one beat of the lay and also whether the sheds are formed by a different movement of the harnesses, as herein described, and also with any other well-known transferring motion to place the tuft-yarns in the shed, taking them from the chain-carriers and returning them again, as is common to this class of looms.

I will now describe the spool-frames, their carrying-chains, and actuating devices, referring to Figs. 3, 4, 5, 8, and 9.

The spool-frame is composed of a bar 24, having at its ends suitable arms 25 to be inserted in the spaces of the links of the chains, to be described, each frame having at each end a suitable hook or engaging device 26 to engage the chain and retain the spool-frame in position thereon.

The spool-frame has suitable intermediate bearings 27 and suitable end bearings 28, said bearings sustaining a plurality of spools 29 end to end, the number of spools used in each beam (they containing the tuft-yarns) and the length of the beam depending upon the width of the tufted fabric to be woven.

In order to arrest the beam 24 to maintain a substantially straight-line position or to prevent it from sagging, so that each spool-frame when taken from its chain to put its tubes 30, containing the tuft-yarns, between adjacent warp-threads and present the tuft-

yarns in position with relation to the warp-threads to be held locked or crossed by a pick of filling, as common in looms for weaving tufted fabric or as in said Patent No. 490,237, and enable the ends of the tuft-yarns to stand in a plane substantially parallel with the plane of the shed, I have provided the beam 24, constituting the body of the spool-frame, with a metallic T-shaped brace 31, of a shape in cross-section to leave arms 32 33, as represented in Fig. 9, said brace being firmly secured in any suitable way, as by screws 34, to the under side of the beam, the portion 32 overlapping one side of the beam and the portion 33 extending downwardly in substantial alignment with the portion 32 and constituting a stiffening means for the beam to prevent sagging thereof between its ends due to the weight of the spools and the attached tubes. The portions 32 and 33 of the brace also have seated upon them and suitably secured thereto, as by solder, the upper rear side of the tubes 30. The tuft-yarn beam will be handled by the transferring device and the tuft-yarns will be inserted in the warp, as provided for in said Patent No. 490,237, to make the fabric described in No. 245,259.

The spool-frames, of any desired number, according to the pattern to be woven, are carried by chains 35, composed of double and single links jointed together, there being a plurality of such chains to thereby support the opposite ends of the spool-frame, the arms 25, as stated, entering spaces between the walls of the double links of the chain, said spool-frames being brought in position to be taken in succession in any predetermined order from the chain by the transferring means for the formation of the rows of tufts in the tufted fabric, and after the tuft-yarns of the spool-frame have been inserted and bound in usual manner in the warp the said tuft-yarns are cut off and the spool-frames are returned again to the chains.

During the time that the transferring mechanism operates to take a spool-frame from the chain and return it to the chain the chains remain at rest, to thereby insure the reengagement of the spool-frames with the chains and the return of the spool-frames to the particular point in the chains from which they were taken.

A pawl-and-ratchet mechanism have heretofore been used to actuate the carrier-chain step by step in order to put each spool-frame in proper position to be engaged by the transferring mechanism; but in the use of such means where the chain is long and carries a number of frames the resistance to starting the chain is so great that sometimes the shaft having the ratchet which is engaged by the pawl to move the chain will fail to turn to the right position, and consequently the chains and the spool-frames will not register properly to be engaged by the transferring mechanism, and consequently the transferring

mechanism will fail to take a frame from the chain. To insure the easy and accurate movement of a part of the chains from which the spool-frame is to be taken, I have provided a secondary chain moving or starting means acting intermittently and independently of the main actuating means for intermittently moving the chains carrying the spool-frames, said secondary means moving a registering-shaft, which insures the starting of that part of the carrying-chains from which the spool-frame is to be taken by the transferring mechanism, and that this registering-shaft may be moved to start the chain easily and without shock and be moved for the required distance I have so constructed the main actuating means for moving the main weight of the chain that said means always maintains a certain amount of slack in the carrying-chain near the registering-shaft, so that when the secondary means for starting the said shaft to move the chain is started into action said secondary means has only to overcome practically a small portion of the weight of the chain, and as soon as the registering-shaft gets under way the main actuating means for the chain comes into play and the two actuating means work in unison to complete the movement of the chains, leaving, however, slack in the chain near the registering-shaft to enable the said shaft to be again started without first moving or starting up the entire weight of the chain. The main actuating means may move the main weight of the chain at the same time that the registering-shaft starts the chain, maintaining the same amount of slack in the chains between said main actuating means and the registering-shaft, or, if desired, the main actuating means may commence its movement earlier and terminate its movement later than the registering-shaft, there being enough slack in the chain provided for that purpose, this being effected by changing the relative diameters of the wheels 63 and 65. This chain is frequently provided with many hundred spools, and the power required to move it is very considerable. The chains, two in number, as herein represented, carry usually in each double link a spool-frame F, (represented in Fig. 4 by a straight dotted line,) several of said spool-frames being represented by full lines in Fig. 3, I having chosen to designate by said letter the spools, tubes, &c. The chains 35 are endless and are extended over the sprocket-wheels 36, carried by a registering-shaft 37, and the opposite end of the chain (see Fig. 4) is extended above, as herein represented, suitable sprocket-wheels 38 on a suitable cross-shaft 39, sustained in suitable hangers 40, secured by bolts 41 to a suitable cross-beam 42, attached, as may be, to the ceiling. Between these sprocket-wheels 36 and 38 the chain is engaged by sprocket-wheels 43 and 44 and by other sprocket-wheels 56 and 57. The upper and lower runs of the chain pass, respectively,

over sprocket-wheels 43 and 44, carried, respectively, by shafts 45 and 46, sustained, respectively, in suitable stands 47 and 48. Between the stands 40 and 48 there are other stands 49, having suitable bearings for shafts 52 and 53 extended across the loom-frame and in practice supported in like manner at or near its opposite ends. The shafts 52 and 53 are provided, respectively, with toothed gears 54 and 55, meshing one with the other, and each shaft 52 and 53 has located upon it in line with the sprocket-wheels 43 and 38 of the shafts 45 and 39 suitable sprocket-wheels 56 57 to receive the upper and lower runs of the chain, said sprocket-wheels being shown in the detail Fig. 15, it being a section looking to the left from the dotted line x^4 , Fig. 4.

The upper and lower runs of the chain are kept seated upon the sprocket-wheels 56 and 57, constituting the main driving means for the chain 35, by or through suitable pressers (represented as sheaves 58) bearing upon the upper side of the chain, said sheaves being sustained by brackets of any usual or suitable form, preferably from the ceiling. The chain is applied to the sprocket-wheels so as to leave a definite amount of slack chain between the sprocket-wheels carried on the shafts 52 and 53 and the sprocket-wheels 43 and 44, the distance between these wheels being so proportioned that the weight of the chains and spool-frames keep the chains taut between the wheels 43 and 44 and the sprocket-wheel 36 on the registering-shaft.

The chain registering or starting shaft 37, having its bearings in the framework A of the loom, is provided, as herein represented, outside said framework with a sprocket-wheel 60, over which is extended the chain 61, which constitutes one form of secondary actuating means operating to start the registry-shaft and the spool-carrying chain positively, being extended over a sprocket-wheel 62, in line with it and partially indicated by breaking away a notched wheel 63, mounted on the same shaft 64, it being a short shaft sustained in the framework A. The shaft 53, at one end thereof outside the bracket 49, has applied to it a notched wheel 65.

The main shaft B^2 , which is rotated continuously, has applied to it a bevel-pinion 66, which engages two bevel-gears 67 and 68, mounted loosely on a shaft 69, (also represented as rotated continuously,) each bevel-gear 67 and 68 being kept normally in engagement with the bevel-gear 66 by suitable collars 70 and 71, suitably fixed to the framework A, the pressure of engagement of the said gears being controlled by the abutting of the gears 67 and 68 against collars 72 and 73, attached to the shaft 69. The shaft 69, between the collars 72 and 73, has a groove which is entered by a spline of a sleeve 74, having an annular groove and surrounded by the forked end of a lever 75, pivoted at 76 and having a suitable handle 77, by which said sleeve may be moved longitudinally of the

shaft 69. The ends of this sleeve have suitable teeth or projections to cooperate with suitable notches at the inner ends of the gears 67 and 68, and when the said sleeve engages one or the other of the gears 67 or 68 the shaft 69 is rotated in one or the other direction, and by changing the position of the sleeve 74 by the lever 75 this direction of rotation of the shaft 69 may be changed at will, or by putting the sleeve in a central position wherein its opposite ends are disengaged from both pinions 67 and 68 the shaft B^2 may be run and actuate the gears 67 and 68, leaving the shaft 69 at rest. Assuming that the operative position of the gear 66 is in engagement with the gear 72 and that the sleeve 74 engages the gear 67, then through suitable means to be described for imparting an intermitting motion from a rotary motion the shaft 53 and 64 will be rotated intermittingly in a direction, let it be supposed, to feed the chain in the direction of the arrow thereon, Fig. 4; but if for any reason it becomes necessary to run the chain backwardly, as is often the case, then the clutch 74 will be moved to engage the gear 68, such backward movement being used at times to repeat the pattern or to use in a reverse order the spool-frames. Sometimes, however, it is necessary to turn the chains and move the spool-frame while the loom is at rest, and to do this I have provided a neutral or central position for the sleeve 74. That the main and secondary chain-actuating means may be moved intermittingly from the continuously-rotating shaft, as 69, said shaft is shown as having at its upper end a bevel-gear 79, having two series of teeth, one at its upper side and the other at the lower side thereof, the teeth at the upper side engaging the teeth of the bevel-gear 80, fast on a rock-shaft 81, sustained in suitable bearings formed for it and connected with some part of the loom-frame or one of the stands referred to. The opposite end of the shaft 81 has a bevel-gear 82, which engages a bevel-gear 83 on a short shaft 84, provided with a hub 85, having a pin 86, said pin engaging intermittingly the notches 87 of the wheel 65 and moving said wheel and the shaft 53 step by step, the rotation of the shaft 53 being prevented when the pin 86 passes from a notch 87 in the rotation of the shaft 84 by or through the concavities 88 of said wheel or plate 65 engaging the circular periphery of the hub 85, said notched plate and projection constituting one form of device for imparting an intermitting movement from a continuous rotating movement, said device being commonly designated as a "pin-and-start" wheel; but instead of such form of device I may use any other usual and suitable device capable of imparting intermitting movement from a continuous rotating movement. The teeth at the under side of the gear 79 mesh with and rotate a pinion 89 on a short shaft 90, suitably supported in the framework A and having connected with it a hub 91, provided with a pin or projection 92, which

enters one after the other a series of notches 93 in a notched plate 94, fast on the shaft 64, said projection 92 and plate 94 constituting a means such as described for imparting intermitting movement to the shaft 64 and the chain 61 from a continuously-moving shaft.

It will be obvious from the foregoing description that the shaft 53, rotated intermittingly, will, through the gears 55 and 54, rotate intermittingly the sprocket-wheels 56 and 57, constituting the main driving mechanism for the chain 35, and a certain amount of slack having been provided for in the chain and located to appear at all times between said sprocket-wheels 56 and 57 and the sprocket-wheels 43 and 44 it will be obvious that said slack will always be maintained in the chain, but that it may be partially taken up whenever the starting registering or starting shaft 37 is put in motion, as it will be by the auxiliary chain 61, immediately after a spool-frame has been put back again into the chain 35, for it is at that time that said chain must be started to put another or succeeding spool-frame in position to be taken therefrom by the transferring means.

In the operation of the loom let it be supposed that the chain 35 and the starting-chain 61 were at rest while the transferring means was taking a spool-frame from the chain to utilize the tuft-yarns of the spool in the production of a row of tufts and until said spool-frame had been returned to the chain. A spool having been returned, it will be supposed that the projection 92 enters a notch in the plate 64 and imparts motion to the chain 61, it in engagement with the sprocket-wheel 60 putting the registering or starting shaft 37 in motion to thus start it and the chain 35 to bring another spool-frame into working position. To start the registering-shaft, the auxiliary chain 61 has to exert but little strain, because of the slack in the chain 35; but when the said shaft has been started, as it may be by a suitable mechanism to impart to it the intermitting movement from a continuously-moving shaft, one form of which mechanism is herein shown, then the rotation of the shaft 52 and 53 is started and, acting through the sprocket-wheels 56 and 57, moves the chain 35, thus supplementing the action of the registering-shaft 61. The shafts 52 and 53 stop, preferably, after the registering-shaft 37 has come to rest, its chain 61 having been stopped, the chain 33 being moved far enough to maintain the usual amount of slack, as stated, so that when the shaft 37 is to be again started after the return to the chain 35 of a spool-frame the auxiliary chain 61 may start the main chain easily. To provide for running the chain 35 in either direction when the loom is at rest, I have extended the shaft 84, which in Fig. 4 is represented in section taken in the line x^6 , Fig. 5, and I have provided said shaft outside a suitable stand 94^x, suspending, as herein represented, from the ceiling,

with a fast pulley 95 and each side of the same a loose pulley, as 96 97, one of which is driven by an open belt and the other by a cross-belt deriving motion from any counter-shaft, the shaft 84 and the shafts 52 and 53 being driven in one or the other direction, according to which one of said belts is put upon the fast pulley 95. As stated, the chain 35, with its spool-frames, is very heavy, that depending upon the length of the same, and frequently this chain and its load amounts to many hundreds of pounds, and to reduce the power required to move this chain I provide all the shafts carrying the chains with roller-bearings, some of said roller-bearings being substantially the same as the roller-bearings sustaining the shaft B² and C², one form of suitable roller-bearing for this purpose being represented enlarged in the detail Fig. 10; but this invention is not limited to the particular form shown of roller-bearing. To retain the slack in the chain 35 between the sprocket-wheels 54 and 55 and 43 and 44 and to insure uniformity in movement of the chain 35, I provide the shafts 45 and 46, respectively, with toothed gears 45^x and 46^x, which mesh one with the other, so that the part of the chain between the wheels 43 and 44 and the wheels 36 on the registering-shaft will always remain at the same tension, said wheels 43 and 44 deriving their movement only through the chain actuated by the main and secondary chain-actuating means.

This invention is not limited to the exact location of the continuously-rotating shaft instrumental in driving the chains nor to the precise form of intermediate connection shown between the said continuously-rotating shaft and the intermittingly-rotating shafts which move the chains intermittingly, as described.

For economy and lightness I prefer to form the T-shaped brace in two parts or of two tinned angle-irons soldered or riveted together at one of the angles, I thereby forming a very stiff brace combined with the maximum of lightness. This T-shaped brace when combined with the usual wood-supporting bar forms a deep rib projecting from the bar and acts to stiffen the bar, which, together with the rib attached to the bar itself, stiffens the bar both laterally and vertically.

A spool-frame constructed as herein described is adapted to be used in any well-known tuft-fabric loom using spool-frames with great advantage.

When the adjusting or starting shaft 37 is moved, as has been described, to bring another spool-frame into working position, the quick rotary starting movement of the shaft and also the stopping of the movement of the shaft acts to swing that spool-frame which is in its most downward position and is the next to be taken from the chain by the transfer-

As the spool-frames are now commonly held they may swing back and forth and get out of place, and consequently the transfer-

rer when it is moved to take a frame from the chain is liable at times to miss and not engage the spool-frame out of its proper position. In order to overcome this difficulty, I have devised a spool-frame positioning and locking device 80^x, herein illustrated as a notched disk, adapted in its rotation to engage the journals 26^x, sustaining the spools 29 in the spool-frame.

10 The guiding-wheel is shown as fastened to and rotating with the sprocket-wheel of the starting-shaft 37, and the notches 81^x in the periphery thereof embrace the journals 26^x of the spools as the disk is rotated and hold
15 the frame from swinging. In the downward movement of the spool-frames, after the starting-shaft is moved and just before the pin of the spool comes into position to be engaged by the guide-wheel 80^x, I provide a spool-frame-detaining device consisting of a flat
20 spring 82^x, carried by a suitable arm 83^x, attached to the loom-frame, said device contacting with the outer end of the spool-frame outside of the tuft-yarn tubes. This spring
25 acts to hold back the spool-frame while the guide-wheel is advancing, aiding the journal 26^x of the spool to enter the notches 81^x of the guide-wheel. There is an arm 83^x and spring 82^x at each side of the loom-frame.

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

1. In a loom for weaving tufted fabrics, a weft-carrying needle, and mechanism to move
35 the same for a plurality of times in succession to carry a weft through a plurality of successive sheds and to then retain the needle at rest without the shed while a plurality of picks of weft so inserted are beat in toward
40 the fell, and then to move the needle again back and forth through a shed and maintain the needle at rest while the pick last laid by it is beat in, when the needle is again operated to insert weft.

45 2. In a loom, a needle to insert weft into sheds, means to actuate said needle substantially uniformly for a plurality of times, and to thereafter leave said needle at rest outside
50 the shed for a substantially long period, when the needle is again operated to lay weft in the shed.

3. In a loom, shed-forming mechanism, a series of spool-frames, means to actuate them, means to take said spool-frames from their
55 actuating means and put them in position with relation to the shed to present the tuft-yarns in said shed, combined with a needle and means to reciprocate it to insert picks of weft in two of said sheds in succession with-
60 out an interval of rest, the second pick serving to lock the tuft-yarns, and means to beat in said two wefts, one holding the tuft-yarns simultaneously to the fell.

4. In a loom, means to form sheds, a needle, means to reciprocate it to insert two suc-
65 cessive picks of weft in two successive sheds and then to retain said needle at rest prepara-

tory to actuating it to insert a third pick of weft into a third shed, combined with a lay
70 and means to retain the same at rest or away from the fell while the two picks of weft referred to are being inserted in the two sheds, and means to thereafter actuate said lay that
75 it may beat in simultaneously said two picks of weft toward the fell.

5. In a loom, shed-forming mechanism to form successive sheds, means to insert picks
80 of weft in said sheds as formed, and a lay, and means to operate it to beat in at one operation toward the fell a plurality of picks inserted in said sheds.

6. In a loom, shed-forming mechanism to form successive sheds, means to insert picks
85 of weft in said sheds as formed, and a lay, and means to operate it to beat at one operation toward the fell a plurality of picks inserted in said sheds, and means to retain the
90 pick-inserting means in position outside the shed while said lay acts to beat in said plurality of picks.

7. A series of spool-frames having tuft-yarns, means to put them into the shed, and
95 means to insert weft into successive sheds, one pick of said weft holding the tuft-yarns, combined with means to move the needle twice in succession without an interval of rest be-
100 tween and a lay and means to actuate it to beat a plurality of wefts into the fell at one operation.

8. A series of spool-frames having tuft-yarns, and means to insure the placing of said
105 yarns in the shed, a lay carrying a reed, a needle, and means to actuate it to insert two successive picks of weft into two successive sheds during one retirement of the lay to its back-
110 ward position, and means to actuate said lay to beat said picks simultaneously into the shed.

9. Means to insert two successive weft-threads in two successive sheds for one beat
115 of the lay, and another weft-thread in another shed for another beat of the lay, combined with a series of tuft-yarns and means to place them in the sheds between the insertions of the weft-threads.

10. In the mechanism of a pile-fabric loom, tuft-yarn-inserting means, a weft-inserting
120 needle, a series of harnesses to form sheds, and a lay to beat the weft and tuft-yarns into the fabric, combined with means whereby preparatory to one beat of the lay in the cycle
125 of movement of the loom two successive insertions of the needle are made into two successive sheds of the warp to thereby place two picks of weft in front of the reed of the lay.

11. In a pile-fabric loom, shed-forming mechanism to form successive sheds in the
130 warp for the body of the fabric, means to insert picks of weft in irregular time, viz: a plurality of wefts in successive sheds by a substantially continuous movement of the
means for inserting the picks, and then leaving the pick-inserting means at rest for a period of time before again moving it to insert

a pick into a following shed; and a lay having operating means to retain it at rest while successive picks of filling are inserted in successive sheds, said lay when operated beating
5 in two picks laid in successive sheds, the lay thereafter remaining at rest while another shed is formed and a pick inserted therein, when said lay is again operated to beat in that pick.

10 12. In a pile-fabric loom, shed-forming mechanism, and means to actuate the same whereby a succession of sheds are formed in a different interval of time from another subsequent shed or sheds.

15 13. In a pile-fabric loom, shed-forming mechanism, and means to actuate the same, whereby a succession of sheds are formed in a different interval of time with relation to another subsequent shed or sheds; weft-inserting mechanism, and means to operate it
20 in different intervals of time that it may insert a succession of picks in successive sheds and then remain at rest preparatory to making another shed for a longer time than between the formation of said successive sheds.
25

14. In a pile-fabric loom, shed-forming mechanism and means to actuate the same whereby a succession of sheds are formed in a different interval of time with relation to
30 another subsequent shed or sheds; weft-inserting mechanism, and means to operate it in different intervals of time that it may insert a succession of picks in successive sheds and then remain at rest preparatory to making another shed for a longer time than
35 between the formation of said successive sheds; and a lay, and means to operate it in different intervals of time, said lay remaining at rest during the formation of successive sheds
40 and the insertion of successive picks of weft in each of said successive sheds, said lay being moved to beat into the fell at one stroke said successive picks of weft, and to thereafter beat in a third pick and remain at rest
45 again for a longer period that a succession of sheds may be again formed and a succession of picks be inserted in said sheds.

15. In a loom for weaving tufted fabric, a spool-frame provided with a series of tuft-yarn tubes and having a T-shaped brace applied to the bar of said frame to prevent the
50 same from springing out of a straight line and to support said yarn-tubes.

16. In a loom for weaving tufted fabric, a spool-frame having bearings to sustain a plurality of spools end to end, a series of tuft-yarn tubes and a brace applied to said bar at
55 two sides thereof and presenting a flange depending from said bar adapted to support said tuft-yarn tubes.
60

17. In a loom for weaving tufted fabric, a spool-frame having bearings to sustain a plurality of spools end to end, and a T-shaped brace applied to the bar of said frame to prevent the same from springing out of a straight
65 line, and a series of tubes secured to the ver-

tical part of said brace at a point above and below the under level of said brace.

18. In a loom, spool-frame-carrying chains, a series of tuft-yarn beams mounted thereon,
70 a plurality of series of sprocket-wheels engaging both runs of the chain, toothed gearing uniting the shafts carrying said sprocket-wheels that they may be moved in unison, driving means for one of said shafts, said driving
75 means acting intermittingly to move the sprocket-wheels and the carrying-chains at the desired times.

19. In a loom, spool-frame-carrying chains, a series of tuft-yarn beams mounted thereon,
80 a series of sprocket-wheels engaging upper and lower runs of said chains, gearing uniting the shafts carrying said sprocket-wheels that they may be moved in unison and actuate said chains, means for rotating the shafts
85 and sprocket-wheels, other series of sprocket-wheels, one of which carries one run of said chains and the other the other run of said chains, and gearing uniting the shafts carrying these latter sprocket-wheels that they
90 may be moved in unison by the movement of the chains.

20. In a loom, spool-frame-carrying chains, a series of tuft-yarn beams mounted thereon,
95 a plurality of series of sprocket-wheels engaging upper and lower runs of said chains, gearing uniting the shafts carrying said sprocket-wheels that they may be moved in unison and actuate said chains, means for actuating the said shafts and sprocket-wheels,
100 other series of sprocket-wheels, one of which carries one run of said chains and the other the other run of said chains, gearing uniting the shafts carrying these latter sprocket-wheels that they may be moved in unison by
105 the movement of the chains, and a chain registering and starting shaft engaging said chains at that portion thereof from which the spool-frames are taken.

21. In a loom, spool-frame-carrying chains,
110 a series of tuft-yarn beams mounted thereon, a plurality of series of sprocket-wheels engaging upper and lower runs of said chains, gearing uniting the shafts carrying said sprocket-wheels that they may be moved in
115 unison and actuate said chains, other series of sprocket-wheels, one of which carries one run of said chains and the other the other run of said chains, gearing uniting the shafts carrying these latter sprocket-wheels that
120 they may be moved in unison by the movement of the chain, and an auxiliary chain and independent means to actuate it intermittingly to start said registering and starting shaft when the chain is to be moved to
125 carry a used spool-frame out of operative position and bring a new spool-frame into operative position.

22. In a loom, spool-frame-carrying chains, a series of tuft-yarn-carrying frames mounted
130 in said chains, two lines of sprocket-wheels one line engaging the upper and the other

the lower run of said chains, additional pairs of sprocket-wheels engaging one pair the upper and the other the lower run of said chains, gearing uniting the shafts carrying the last-named sprocket-wheels, said chains presenting slack between the said sprocket-wheels which is maintained throughout the operation of the loom, and a registering-shaft having sprocket-wheels and engaging the bend in the spool-frame-carrying chains at that part thereof from which the spool-frame is taken, and independent positively-actuating means to start said registering-shaft and the sprocket-wheels constituting the main actuating means for the said spool-frame-carrying chain.

23. In a loom, a chain carrying spool-frames, a main and a secondary actuating means for said chain, a continuously-rotating shaft, and devices between it and said main and secondary actuating means to operate the same intermittingly.

24. In a loom, a spool-frame-carrying chain, and actuating means therefor, said means presenting two series of sprocket-wheels, one series for each run of the chain, and means to actuate said sprocket-wheels in unison.

25. In a loom, a plurality of sprocket-chains, a plurality of shafts, each having sprocket-wheels, the sprocket-wheel of one shaft engaging one run and the sprocket-wheels of the other shaft engaging another run of said chain, toothed gears on the shaft carrying said sprocket-wheels, a continuously-rotating shaft and devices intermediate it and one of the shafts carrying one set of said sprocket-wheels to move said shaft intermittingly.

26. In a loom, a spool-frame-carrying chain, main actuating means therefor and a registering or starting shaft having sprocket-wheels engaging said chain, a secondary actuating means for moving said shaft, and devices, to actuate the said main and secondary chain-actuating means in either of two directions either forward or backward at will.

27. In a loom, chain carrying tuft-yarn frames and actuating means to move said chain automatically and intermittingly during weaving, said actuating means containing a clutch, and means to change the position of said clutch to insure the movement of said chain either forward or backward.

28. In a loom, chains carrying tuft-yarn frames, automatically - operating actuating

means for moving said chain intermittingly when the loom is being moved and running, and independent automatically - operating means to actuate said chain when the loom is at rest and not running.

29. In a loom, a chain, a sprocket-wheel engaging said chain, a series of spool-frames engaged with and moved by said chain, and a spool-frame positioning and locking device to engage the spool-frames as the chain carrying them passes about the said sprocket-wheel, whereby the spool-frames are held rigidly in position to be engaged by usual transferring means.

30. In a loom, a chain, a series of spool-frames connected with said chain, means to move the chain, spool-frame-detaining means to meet and temporarily arrest the spool-frame as the latter is being moved by the chain, and spool-frame-locking means rotating with the means for moving the chain, the temporary arresting of the spool-frame facilitating the engagement of the locking means with the spool-frame to maintain it firmly in place.

31. In a loom, a spool-frame-carrying chain, main actuating means therefor, a registering or starting shaft, a secondary actuating means for moving said shaft, and devices to actuate the said main and secondary chain-actuating means intermittingly.

32. In a loom for weaving tufted fabrics, the combination with endless chains constituting carriers for a series of tuft-spools, transferring means for removing said tuft-spools from and inserting them into the said chains, means for imparting an intermittent traveling movement to the portion of the chains from which a spool is to be removed and replaced, and means whereby a different intermittent traveling movement is imparted to the main portion of the chain.

33. In a loom, a spool-frame-carrying chain, main actuating means therefor operating intermittingly, a registering or starting shaft, and a secondary actuating means for intermittently moving said shaft.

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

HORACE WYMAN.

Witnesses:

JUSTIN A. WARE,
SAMUEL B. SCHOFIELD.