

No. 709,047.

Patented Sept. 16, 1902.

M. SALDIN.
KNITTING MACHINE.

(Application filed Mar. 18, 1901. Renewed Dec. 26, 1901.)

(No Model.)

5 Sheets—Sheet 1.

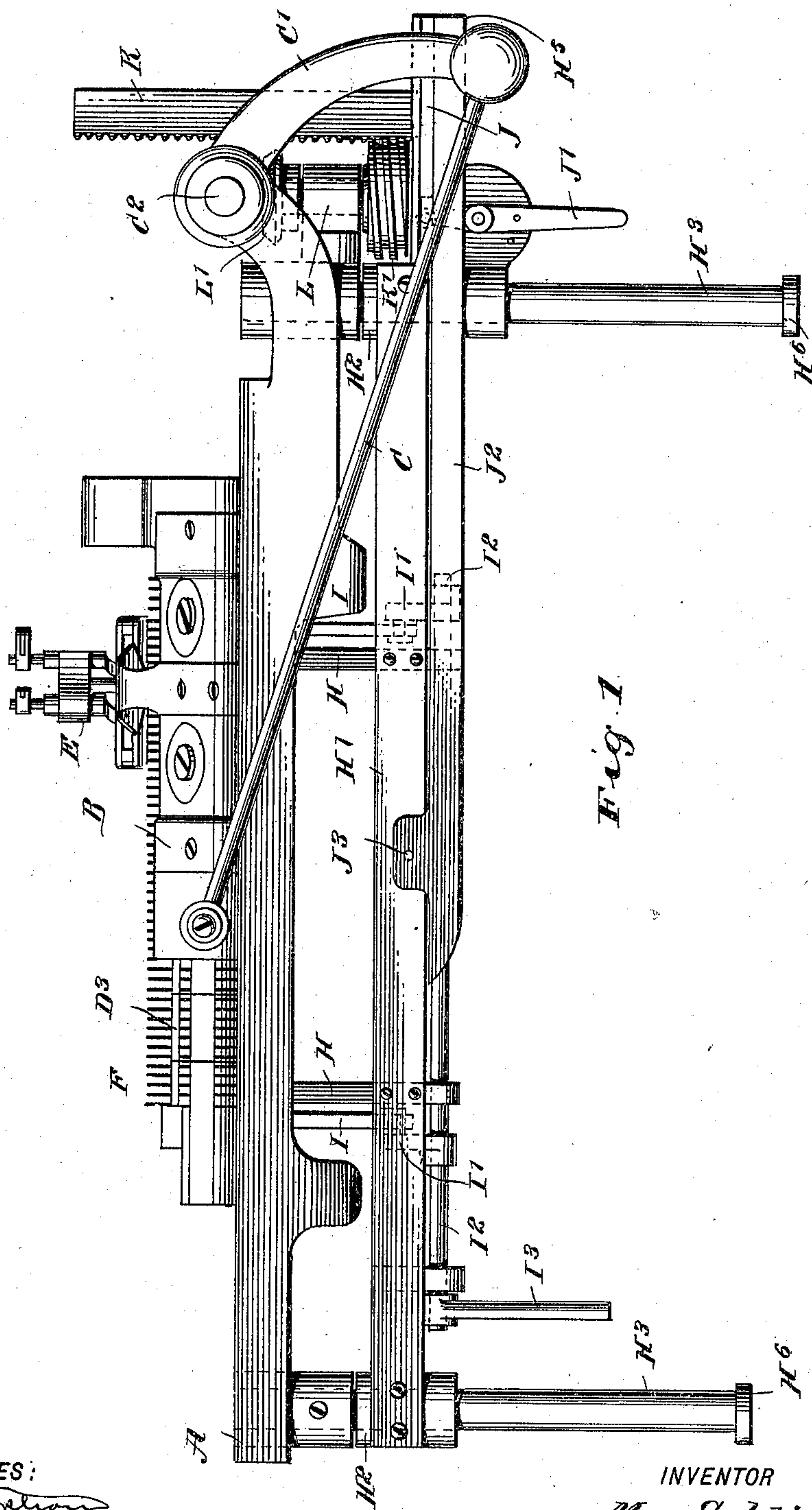


Fig. 1

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ATTORNEYS

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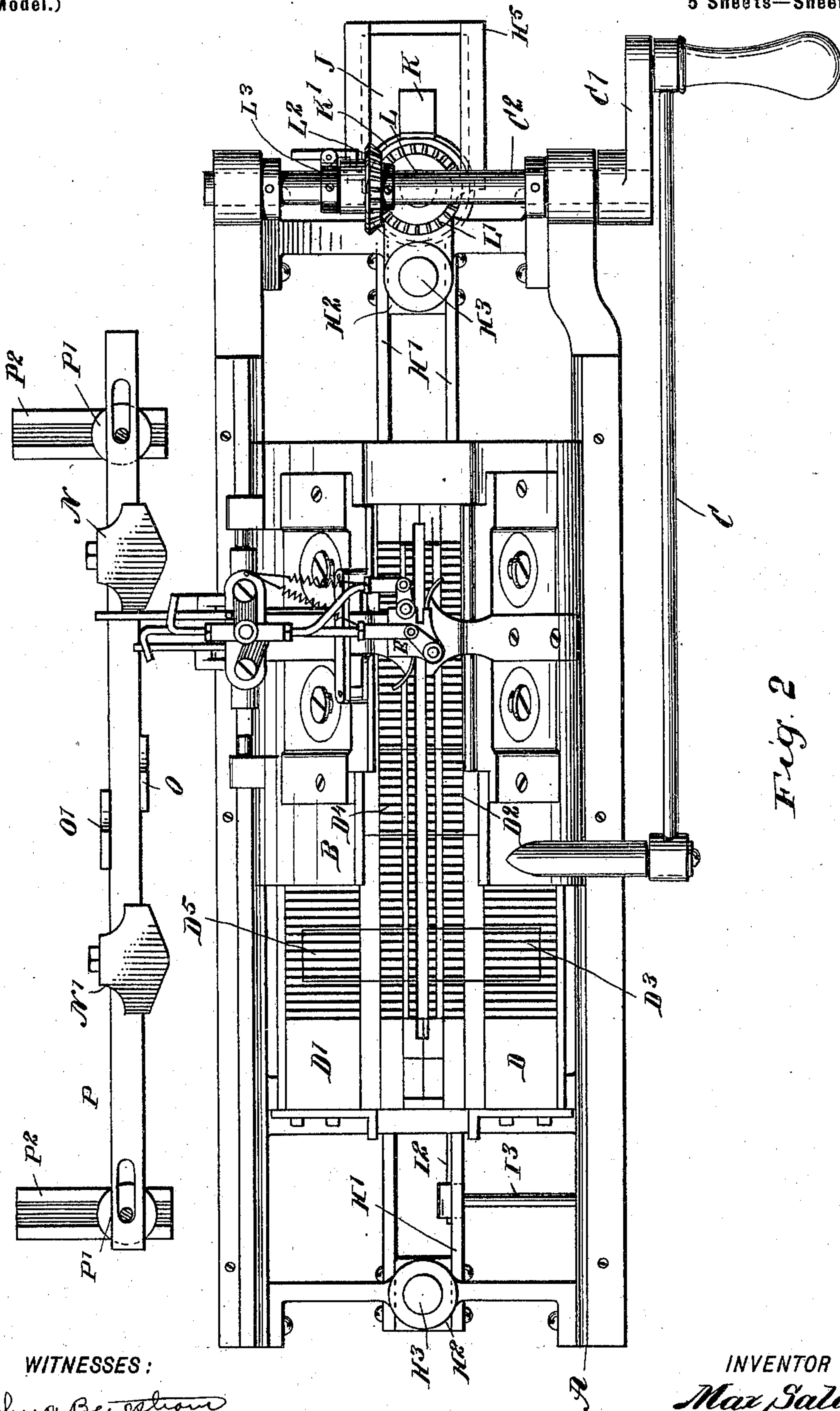


Fig. 2

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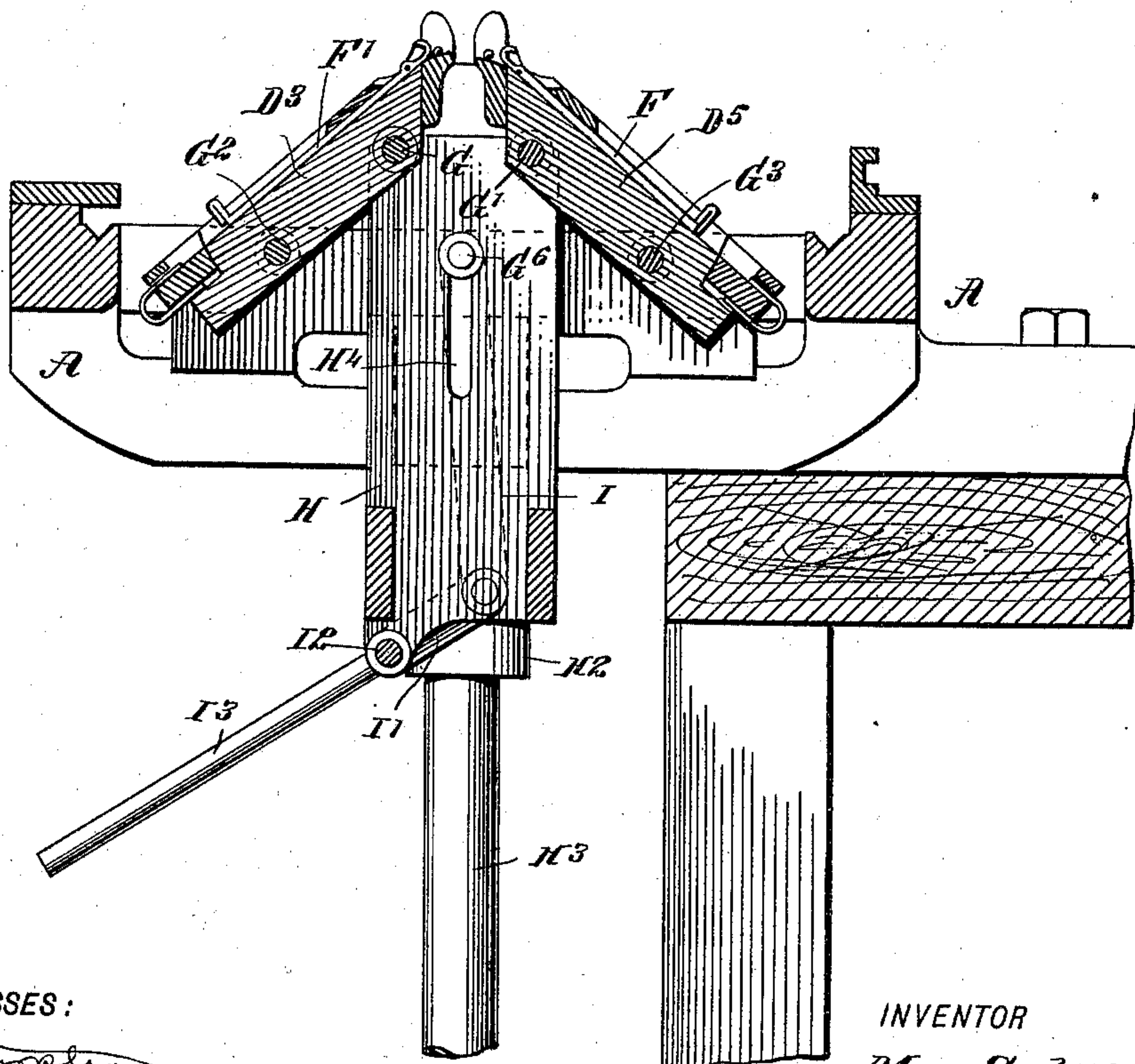
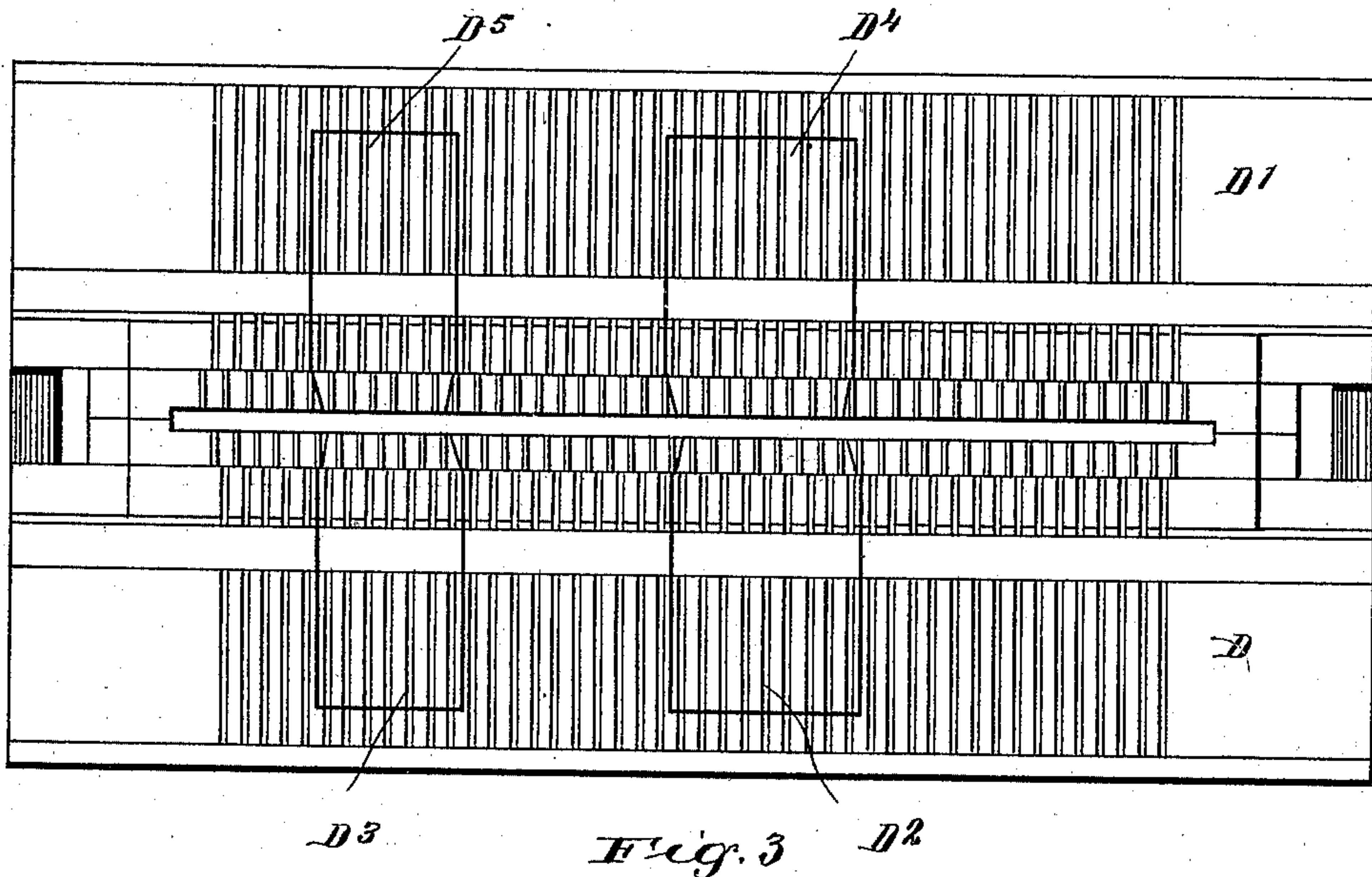
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(No Model.)

5 Sheets—Sheet 3.



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Fig. 4

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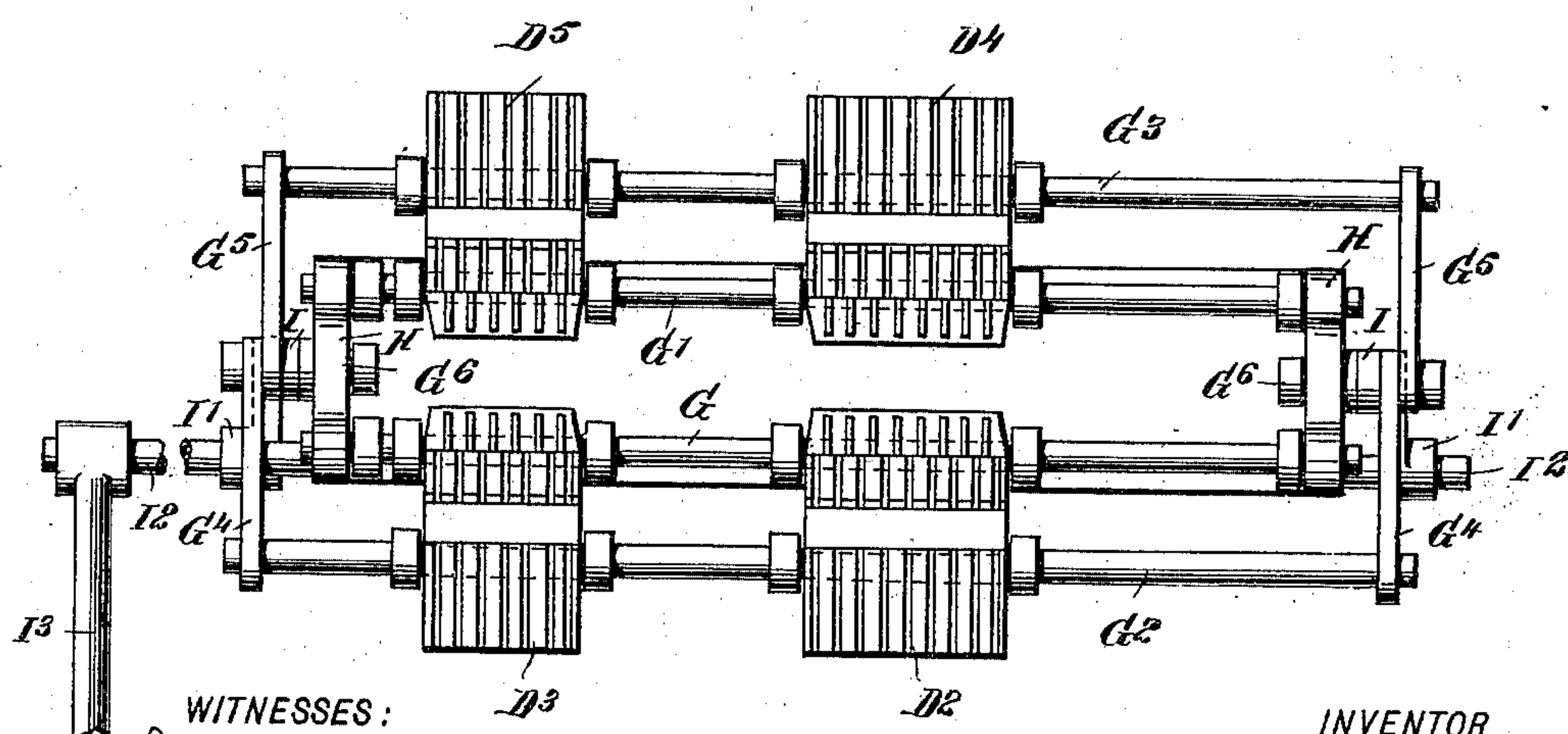
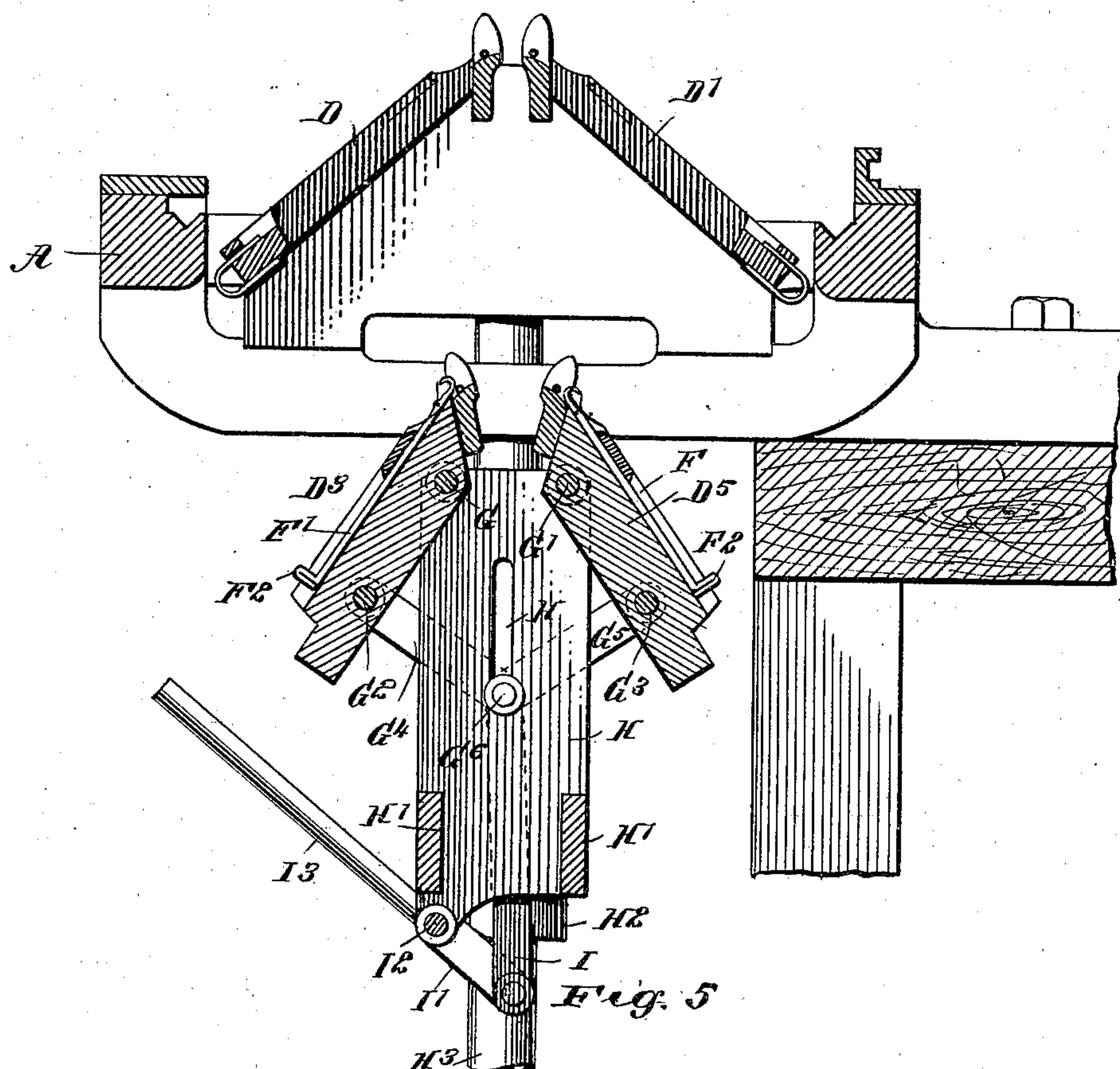
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5 Sheets—Sheet 4.



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Fig. 6

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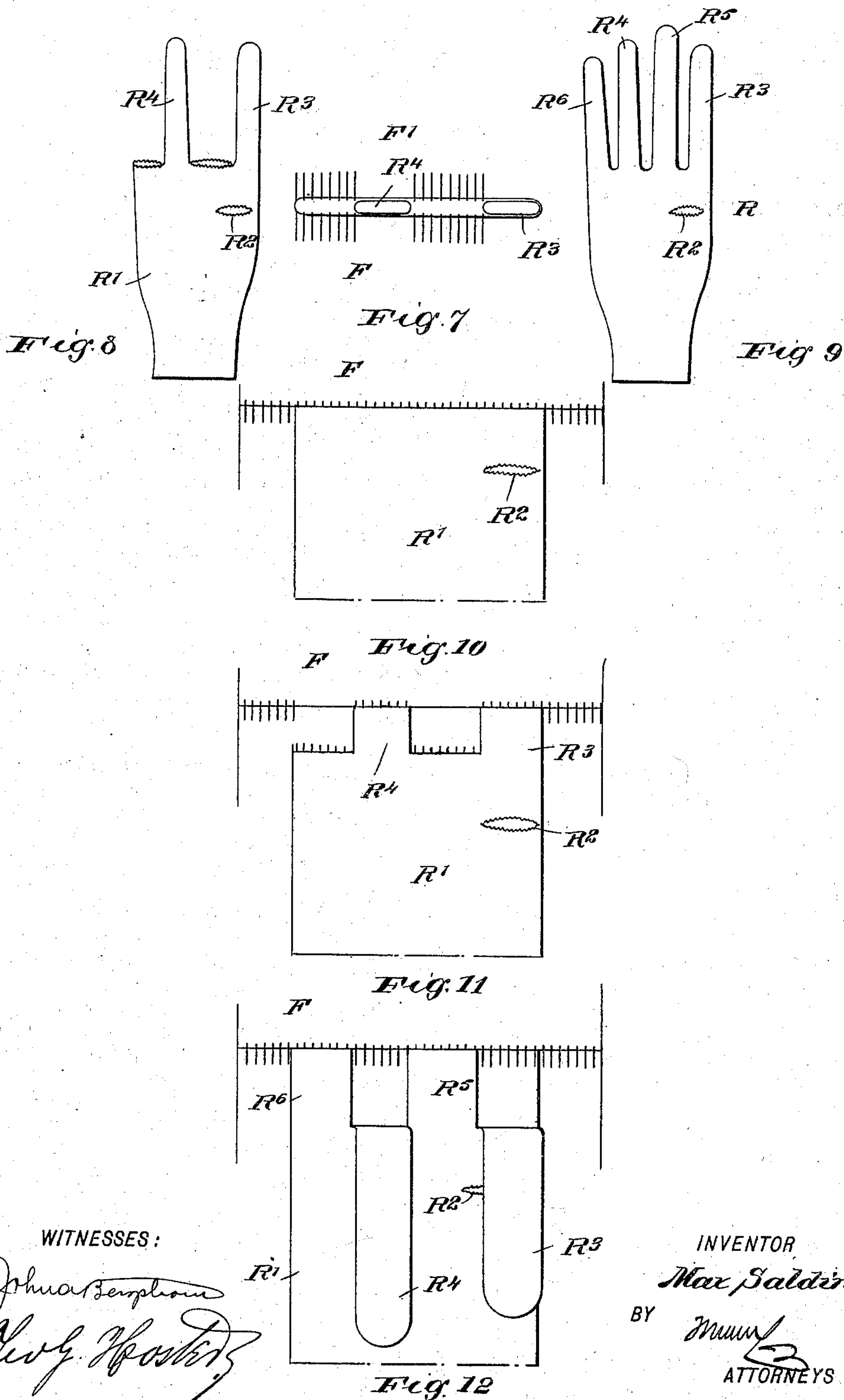
Patented Sept. 16, 1902.

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(Application filed Mar. 18, 1901. Renewed Dec. 26, 1901.)

(No Model.)

5 Sheets—Sheet 5.



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UNITED STATES PATENT OFFICE.

MAX SALDIN, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO OTTO L. MAYER, OF NEW YORK, N. Y.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 709,047, dated September 16, 1902.

Application filed March 18, 1901. Renewed December 26, 1901. Serial No. 87,324. (No model.)

To all whom it may concern:

Be it known that I, MAX SALDIN, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Knitting-Machine, of which the following is a full, clear, and exact description.

The invention relates to knitting-machines having two straight rows of needles and a yarn or thread carrier for feeding separate threads or yarns to the needles during part of the stroke of the carriage, as shown in the Letters Patent of the United States, No. 647,800, granted to me on April 17, 1900.

The object of the invention is to provide a new and improved knitting-machine, more especially designed for knitting gloves and like articles having more than two tubular portions, the arrangement being such that the stitch carrying groups of needles may be thrown out of knitting action without detachment of the stitches to move downward with the article during the time certain tubular portions are being formed by the remaining needles. For instance, in a glove the rear portion is first knitted and then groups of needles are thrown out of knitting position, retaining, however, part of the stitches, and the groups of needles are then caused to move bodily with the knitted wrist portion while the remaining needles form two alternate fingers—say the first and the third fingers—and when this has been done the groups of needles, with the stitches thereon, are returned to the working position, and then the threads or yarn are fed only to the returned groups of needles to finish the second and fourth fingers of the glove.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged plan view of the needle-plates.

Fig. 4 is a transverse section of the improvement. Fig. 5 is a similar view of the same with groups of needles and their needle-plate sections in a lowermost position. Fig. 6 is a plan view of the movable needle-plate sections and their supports. Fig. 7 is a diagrammatic plan view of the formation of the glove in the machine. Fig. 8 is a side elevation of the fabric, showing the wrist portion and two fingers completed. Fig. 9 is a like view of the fabric, showing the four fingers completed. Fig. 10 is a diagrammatic side elevation showing the needles and the wrist portion of the glove on the needles. Fig. 11 is a similar view showing the rear portion, two fingers partly knitted, and the needles; and Fig. 12 is a like view showing the wrist portion of the fabric, two completed fingers and the other two fingers partly finished, and with the groups in position.

The improved knitting-machine is mounted on a suitably-constructed frame A, on which is mounted to reciprocate a carriage B, connected by a pitman C with a crank-arm C', attached to a shaft C², extending transversely and journaled in suitable bearings carried on the main frame A, the said shaft being either rotated by hand or by power to impart a reciprocating motion to the carriage B over the needle-plates D D', mounted on the main frame A. In the needle-plates D D' are mounted to slide needles F F', respectively, actuated in the usual manner from the reciprocating carriage B with either a single yarn or two yarns or threads fed to the needles or groups thereof by a suitable double thread-carrier E, similar to the one shown and described in the Letters Patent of the United States above referred to. The needle-plates D D' have sections D² D³ and D⁴ D⁵, respectively, spaced apart and carrying groups of needles which may be caused to move bodily with said sections out of a knitting position and descend with the fabric already knitted, as hereinafter more fully described. The needle-sections D² D⁴ are located directly opposite each other to form a pair, and in a similar manner the sections D³ D⁵ are arranged opposite each other to form a pair, and each pair of sections serves to form, with the thread-carrier E, a tubular por-

tion of the fabric. For instance, as shown, the removable sections $D^2 D^4$ and $D^3 D^5$ and the groups of needles carried thereby serve to form the second and fourth fingers of a glove, as is plainly indicated in Fig. 12 and as hereinafter more fully described. The needles in the stationary portions of the needle-plates $D D'$ between the sections $D^2 D^4$ and $D^3 D^5$ and those at the outside thereof are used for forming, with the thread-carrier E, the first and third fingers, as indicated in Fig. 11, at the time the sections $D^2 D^4$ and $D^3 D^5$, with their groups of needles, are in an inactive position and descending with the wrist portion of the fabric already knitted. It is understood that in knitting a wrist portion of a glove the movable needle-plate sections and the groups of needles thereon are in an uppermost active position, the same as in an ordinary knitting-machine having two rows of needles. In order to produce the desired result, the movable needle-plate sections are mounted on suitable devices presently to be described in detail. The needle-plate sections $D^2 D^3$ are fulcrumed on a longitudinally-extending shaft G, and the needle-plate sections $D^4 D^5$ are similarly hung on a shaft G', both shafts G G' being held on vertical arms H, forming part of a frame H', having bearings H^2 , mounted to slide vertically on guideways or posts H^3 , depending from the main frame A, as is plainly illustrated in Fig. 1. The lower ends of the sections $D^2 D^3$ and $D^4 D^5$ are engaged by shafts $G^2 G^3$, pivotally connected at their ends by links $G^4 G^5$ with pins G^6 , mounted to slide vertically in elongated slots H^4 , formed in the vertical arms H, as is plainly shown in Figs. 4 and 5. The pins G^6 pivotally connect the links I with arms I', secured on a longitudinally-extending shaft I², journaled in suitable bearings on the lower portion of the frame H', and on one end of the shaft I² is secured a handle I³ under the control of the operator to permit the latter to impart a swinging motion to the shaft I², and thereby cause the arms I' thereof to move the links I up or down, according to the direction in which the handle I³ is moved. The up-and-down movement of the links I causes a corresponding movement of the pins G^6 , so that the links $G^4 G^5$ impart a swinging motion to the needle-plate sections $D^2 D^3$ and $D^4 D^5$ to swing the same either into alinement with the fixed needle-plate portions, as shown in Fig. 4, or out of alinement with the same preparatory to moving the movable needle-plate sections and their groups of needles downward with the fabric, as previously mentioned and hereinafter more fully described. This preliminary swinging of the removable needle-plate sections is desirable to readily disengage the needle-heels F^2 from the cams of the carriage.

The lower ends of the posts H^3 are provided with collars or heads H^6 to prevent accidental disengagement of the frame H' from said posts. One end of the frame H' is formed

with guideways H^5 , in which is mounted to move longitudinally a slide J, controlled by the operator by means of a lever J', said slide J having an extension J^2 , reaching to the middle portion of the frame H' to engage the sides thereof by lugs J^3 , as is plainly indicated in Fig. 1. On the slide J is secured an upwardly-extending rack K, in mesh with a worm-wheel K', secured on the lower end of a shaft L, journaled in suitable bearings on the main frame A, and carrying at its upper end a bevel gear-wheel L', in mesh with a bevel gear-wheel L², mounted to rotate loosely on the shaft G² and adapted to be locked thereto by a suitable clutch L³, so that when the clutch is in engagement with said pinion L² and the shaft is rotated then a rotary motion is transmitted by the bevel gear-wheels L² L' to the shaft L and to the worm-wheel K' to impart a downward-traveling motion to the rack K, the slide J, and the frame H' to remove the needle-plate sections in the same direction. When the frame H' reaches its lowermost position after the completion of the first and third fingers of the glove, as previously mentioned, then the operator swings the lever J' to one side, so as to move the slide J and the rack K outward, and thereby disengage the rack from the worm-wheel K' to permit the operator to quickly lift the frame H' back to an uppermost position, and when this has been done the lever J' is swung in a reverse direction to move the slide J inward and to again engage the rack K with the worm-wheel K' to support the frame H' and the parts carried thereby in an uppermost position. When it is not desired to move the frame H', the needle-plate sections, and the groups of needles downward, then the operator disconnects the bevel gear-wheel L² by the clutch L³ from the shaft C², so that knitting can proceed with two full rows of needles in the usual manner.

The releasing devices for the threads and yarns in the double carrier E are controlled by sets of cams N N' and O O', mounted on a suitable bar P, held to slide vertically on supports P', mounted to slide transversely in guideways P². The action of the releasing devices for the double carrier E is more fully described in the patent above referred to, so that further description of the same is not deemed necessary in this application.

The operation is as follows: When knitting the wrist portion R' of the glove R, for instance, but a single yarn or thread is used in the carrier E, and the cam-bar P is then in a rearward position to render the yarn-releasing devices in the carrier inactive, so that the single yarn or thread passes from the carrier to the two rows of needles in the usual manner of knitting single tubular fabrics. The needle-plate sections $D^2 D^3$ and $D^4 D^5$ are held in an uppermost position flush with the remaining stationary portions of the needle-plates, the groups of needles in the movable needle-plate sections being arranged in the

same position as the rest of the needles. The gear-wheel L^2 is unlocked from the shaft C^2 , so that when the latter is rotated the carriage is reciprocated and the needles in the two rows of needles $F F'$ are actuated, and the single thread or yarn is fed by the carrier E to the needles to knit the wrist portion in the usual manner. (See Fig. 10.) During the knitting of the hand portion R' a white thread is put in a number of needles and pulled out when the knitting is completed to leave the thumb opening R^2 in the hand portion. As soon as the wrist portion R' is completed and it is desired to form the fingers for the glove then the operator first throws the handle I^3 upward to bring the needle-plate sections $D^2 D^3 D^4 D^5$ and their groups of needles inward and bring the needle-shanks F^2 out of the path of the needle-shifting cams held in the carriage B , and then the operator connects the clutch R^3 with the gear-wheel L^2 , so that upon further rotation of the shaft C^2 the frame H' and the parts carried thereon travel downward. The movable needle-plate sections $D^2 D^3$ and $D^4 D^5$ and the groups of needles thereon move bodily downward with the frame H' and at the same rate of speed as the finger portions $R^3 R^4$, it being, however, understood that the groups of needles in said needle-plate sections retain the last stitches of the fabric. The cam-bar P during the knitting of the fingers is in a forward position, as shown in Fig. 2, and two yarns or threads are alternately fed by the double carrier E' to the needles contained in the stationary needle-plates to form two tubular fabrics for the first finger R^3 and the third finger R^4 . (See Fig. 11.) When the fingers are completed, the operator throws the lever J' to the left to throw the rack K out of mesh with the worm-wheel K' , and then the operator slides the frame H' and the parts supported thereon, together with the fabric already knitted, into an uppermost position, after which the lever J' is returned to again engage the rack K with the worm-wheel K' . The arm I^3 is now swung downward to return the needle-plate sections $D^2 D^3 D^4 D^5$ and their groups of needles to their normal position—that is, back into alinement with the stationary needle-plates and their needles—so that upon further reciprocation of the carriage the cams thereof actuate the groups of needles. Previous to knitting the second and fourth fingers the operator shifts the cam-bar P to the left, so that the cams thereof actuate the carrier-releasing devices in such a manner that the two threads or yarns are now only fed to the groups of needles in the needle-plate sections $D^2 D^3 D^4 D^5$ to form the second finger R^5 and the fourth finger R^6 . (See Fig. 12.) The previously-formed fingers $R^3 R^4$ are turned down upon the wrist portion R' before starting the formation of the fingers $R^5 R^6$, and said fingers $R^3 R^4$ move down with the wrist portion and with the fingers $R^5 R^6$ as the latter are being formed. (See Fig. 12.)

The needle-plate sections $D^2 D^3$ and $D^4 D^5$ and the groups of needles thereon are moved bodily downward during the knitting of the first and third fingers R^3 and R^4 to retain the stitches of the remaining part of the wrist portion for the subsequent knitting of the second and fourth fingers. When the first and third fingers are finished, then their needles are completely free of stitches, and hence these needles can remain in an uppermost position, as no work is required of them during the now following knitting of the second and fourth fingers with the groups of needles in the needle-plate sections. The finished first and third fingers are turned down upon the wrist portion to be out of the way of the thread-carrier during the knitting of the second and fourth fingers, it being understood that the carriage in all cases travels its full stroke on the frame B . As the needle-plate sections $D^2 D^3$ and $D^4 D^5$ travel downward with the beginning stitches for the second and fourth fingers thereon, it is evident that said stitches need not be unhooked from the groups of needles in said sections and afterward re-threaded, as would be necessary if the sections were stationary in an uppermost position. Now by the arrangement described the wrist portion is first formed in the manner of forming an ordinary single tubular fabric, and then alternate fingers are formed by the use of two threads in a double thread-carrier operating in the manner more fully described in the patent above referred to, and when this has been accomplished the next two fingers are formed in a similar manner; but it is expressly understood that in either case it is not necessary for the operator to detach stitches from the needles or to readjust the same, as is the case in knitting-machines heretofore constructed and used for the same purpose.

Although I have described the improvement for knitting gloves, it is evident that other articles having two or more tubular portions can be knitted on the machine.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A knitting-machine having groups of needles bodily movable with the fabric knitted, as set forth.
2. A knitting-machine having spaced groups of needles bodily movable with the fabric knitted, as set forth.
3. A knitting-machine, provided with needle-plates having movable sections, as set forth.
4. A knitting-machine, provided with needle-plates having movable sections arranged in pairs, as set forth.
5. A knitting-machine, provided with needle-plates having movable sections arranged in pairs, and means for moving said movable sections and their groups of needles bodily with the fabric knitted, as set forth.
6. A knitting-machine, provided with nee-

dle-plates having movable sections arranged in pairs, and means for moving said movable sections and their groups of needles bodily with the fabric knitted, said means operating
5 in conjunction with the movement given to the carriage of the machine, as set forth.

7. A knitting-machine, provided with needle-plates having movable sections, needles contained in said plates and their sections,
10 means for imparting a swinging motion to the said needle-plate sections and the groups of needles therein, and means for feeding said needle-plate sections in unison with the fabric as the latter is knitted, as set forth.

15 8. A knitting-machine, comprising a reciprocating carriage, a double yarn or thread carrier having releasing devices, means for operating the same, needle-plates having movable sections, needles contained in said needle-plates and their sections means for imparting a swinging motion to said needle-plates, and means for moving said sections
20 and their groups of needles bodily downward

with the fabric as the latter is knitted, as set forth.

9. A knitting-machine, comprising a reciprocating carriage, a double yarn or thread carrier having releasing devices, means for operating the same, needle-plates having movable sections, needles contained in said needle-plates and their sections, means for imparting a swinging motion to said needle-plates, and means for moving said sections and their groups of needles bodily downward with the fabric as the latter is knitted, said
30 first-named means being under the control of the operator, and the second-named means operating in conjunction with the reciprocating carriage, as set forth.

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

MAX SALDIN.

Witnesses:

BANET DAVIDSON,
ARNOLD KATZ.