F. MARSCHALEK.

EMBROIDERY MACHINE.

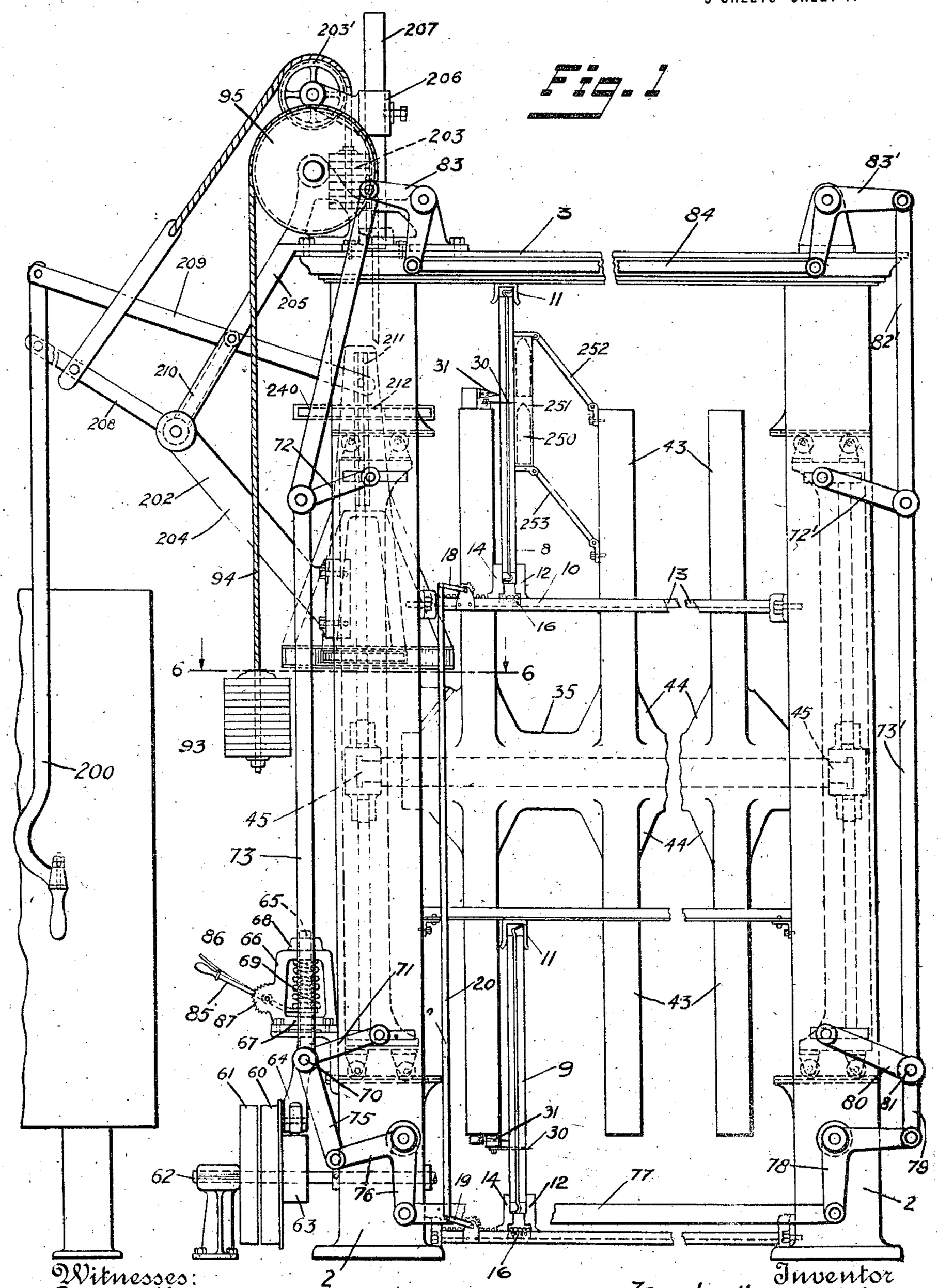
APPLICATION FILED MAR. 26, 1914.

1,154,871.

Patented Sept. 28, 1915.

5 SHEETS—SHEET 1.

Fig. 1



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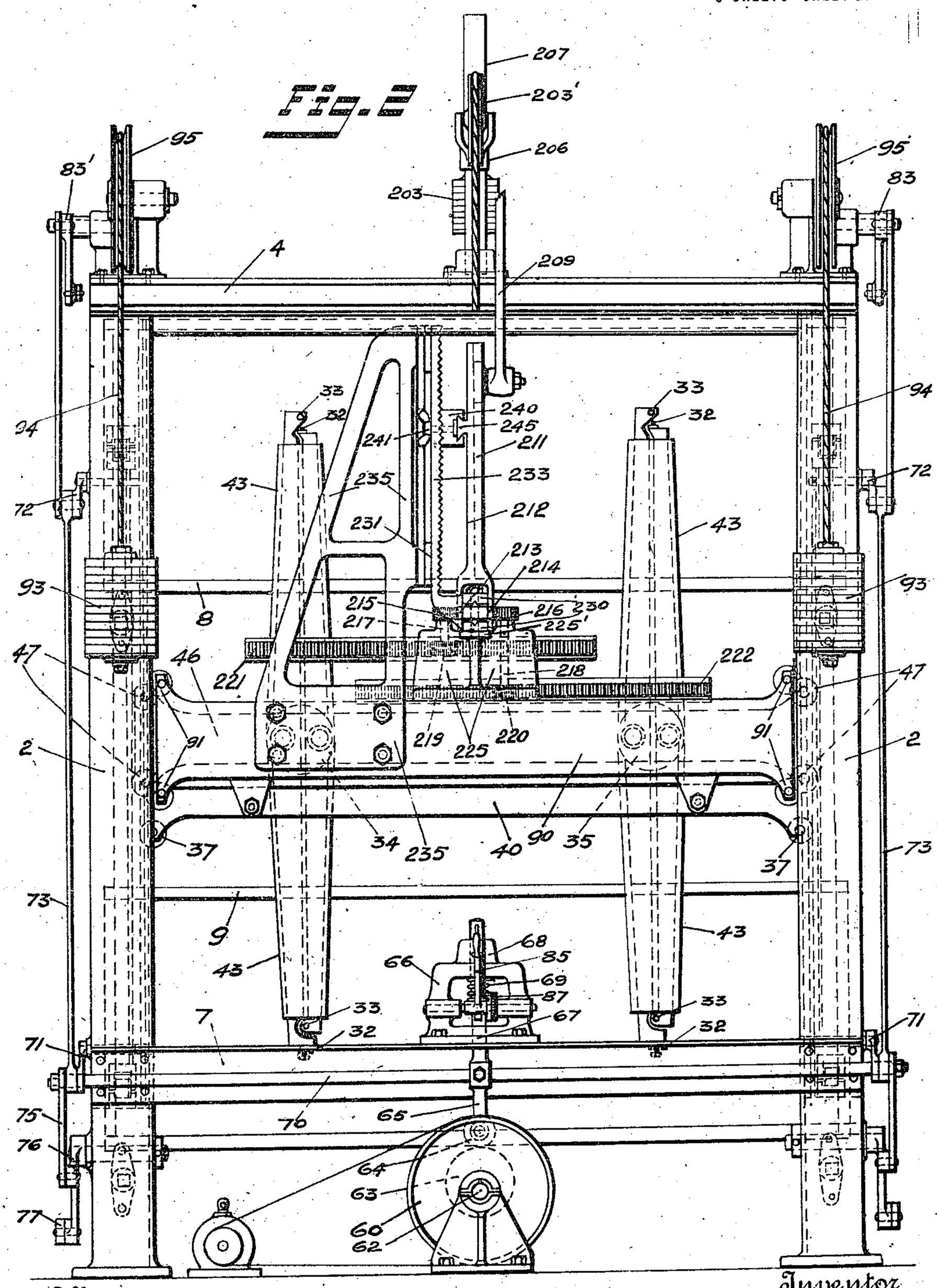
5 SHEETS—SHEET 2.

Fig. 2



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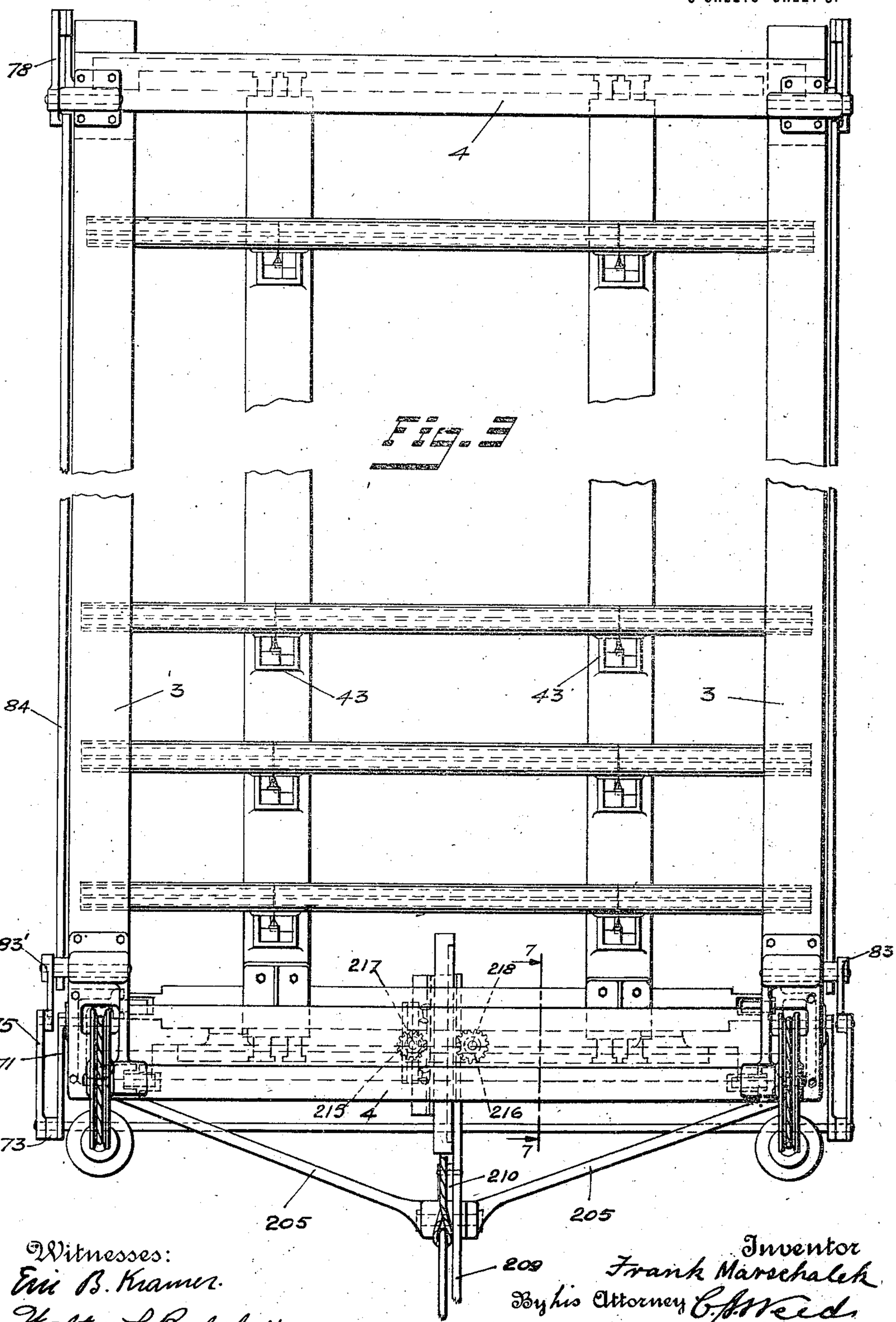

Fig. 3

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5 SHEETS—SHEET 4.

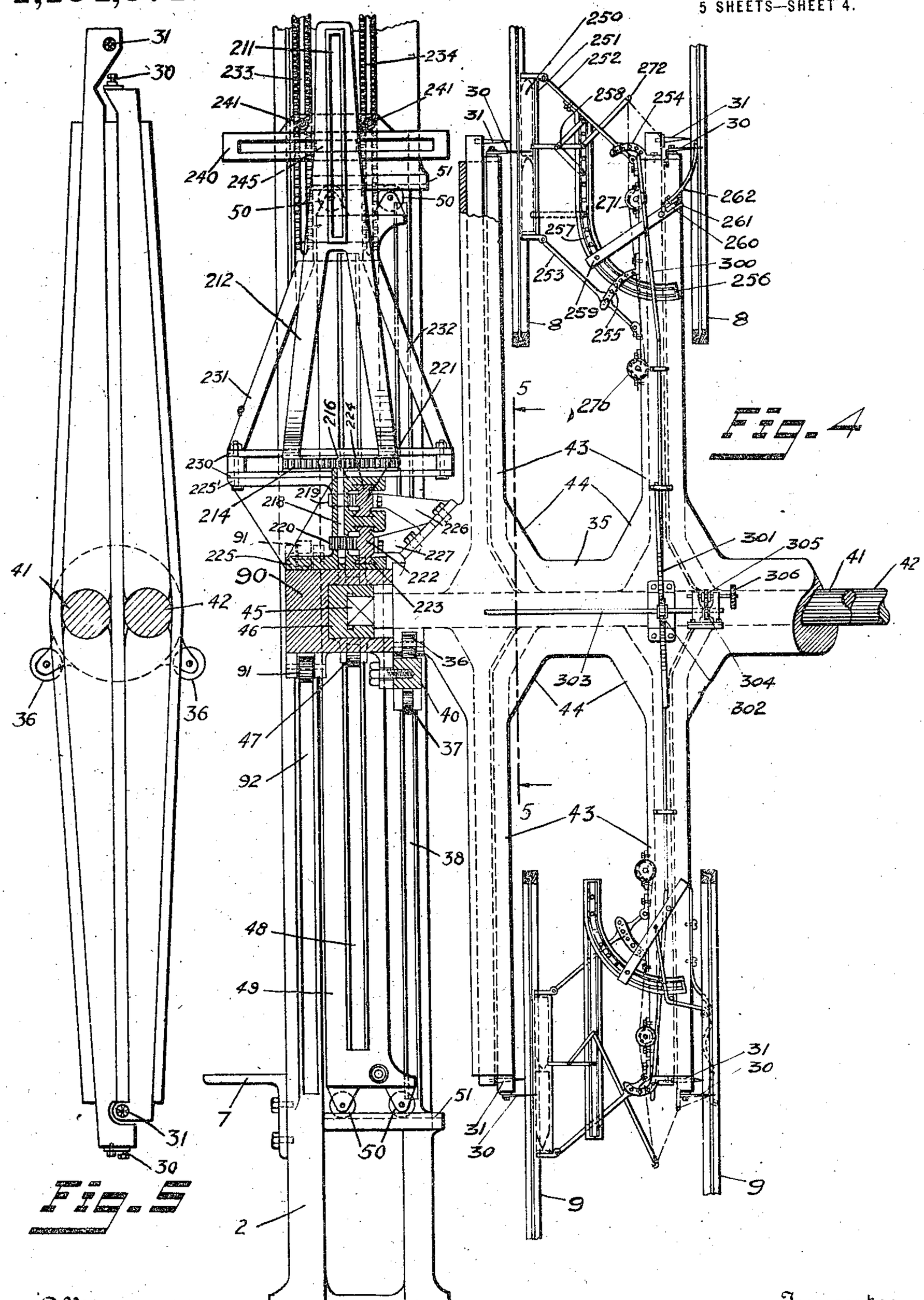

Fig. 4

Fig. 5

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5 SHEETS—SHEET 5.

Fig. 6

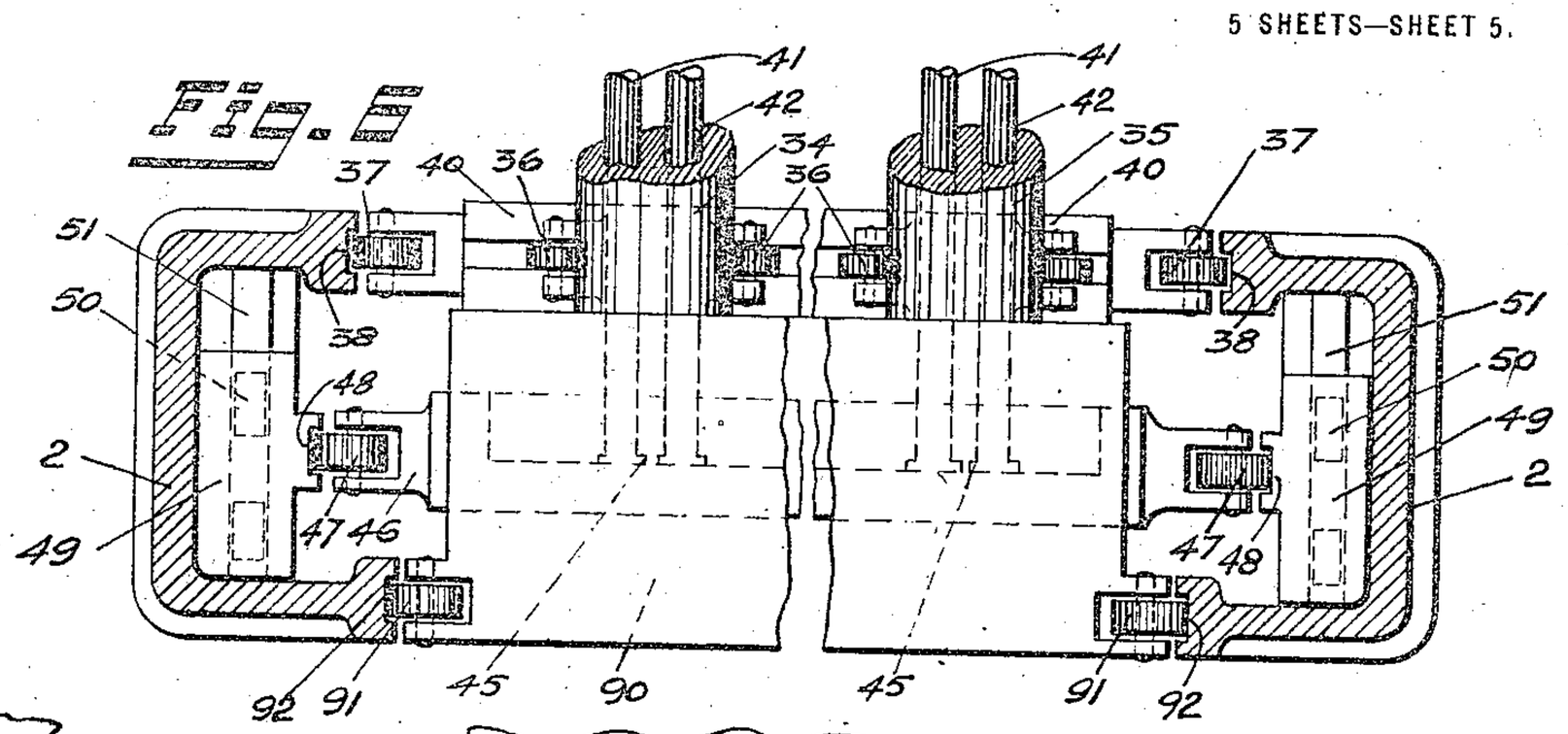


Fig. 9

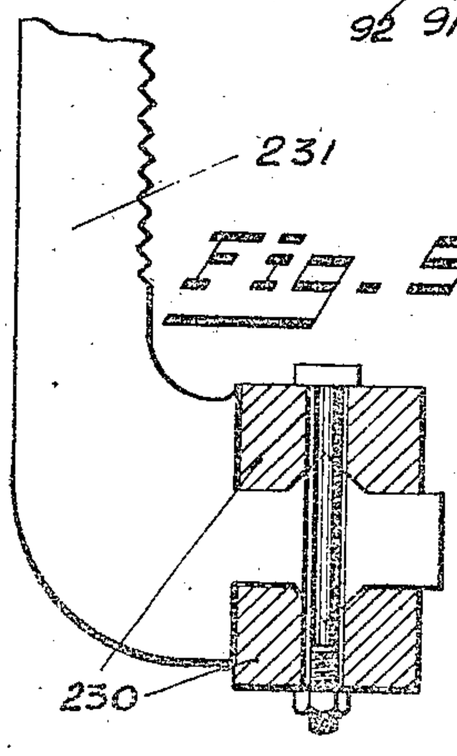


Fig. 8

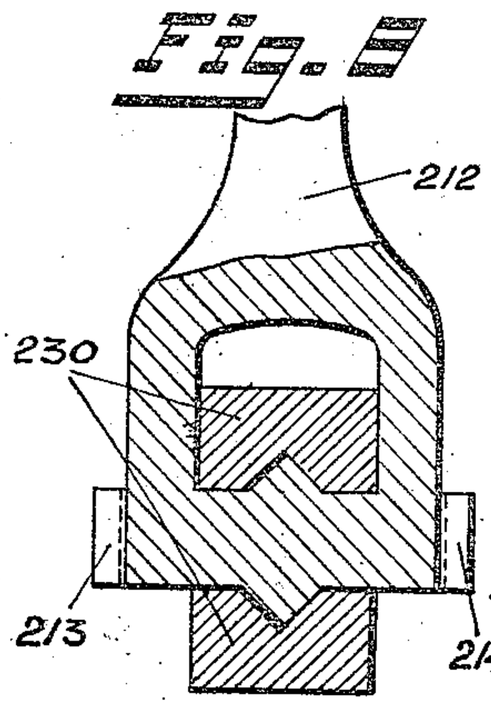
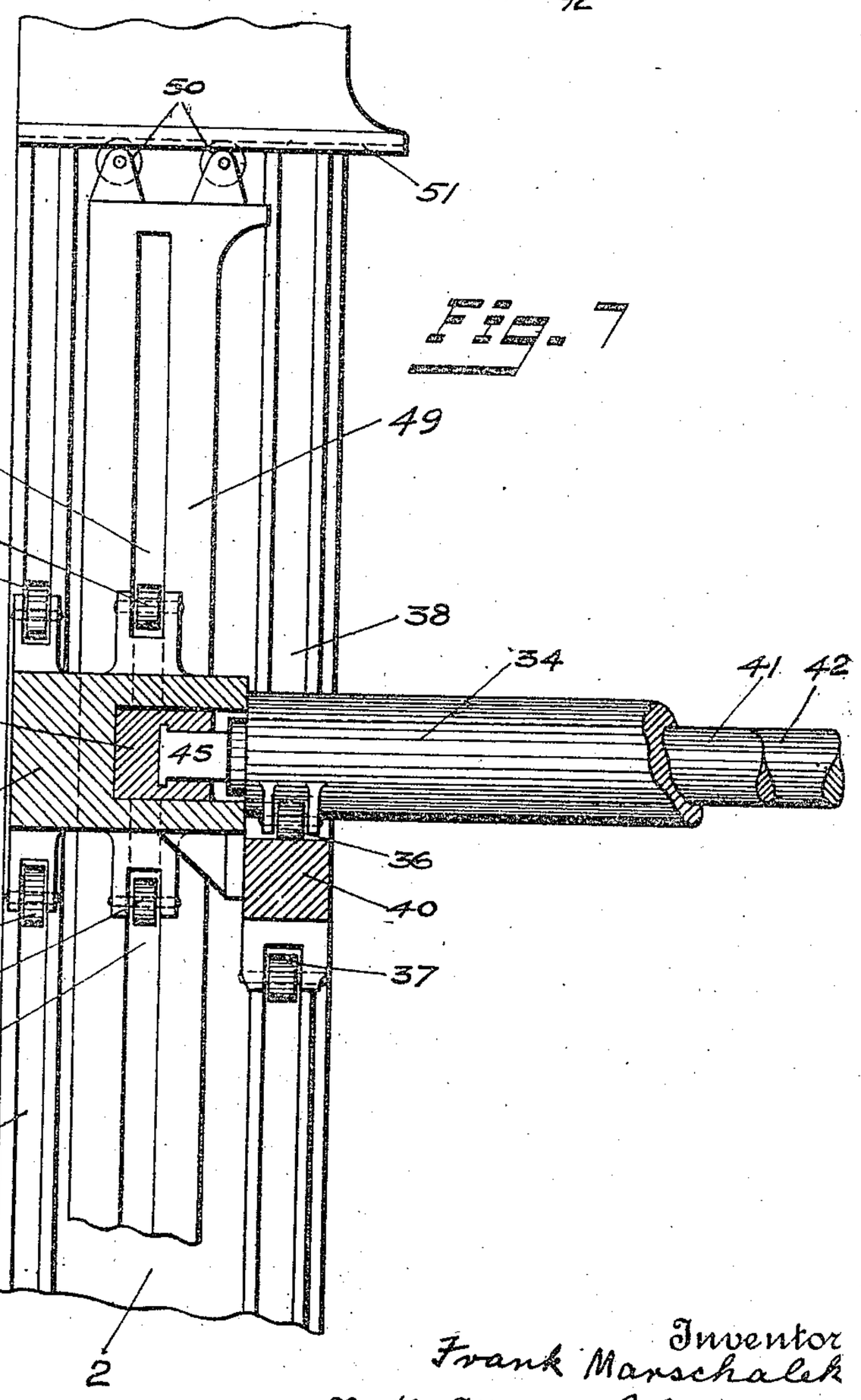


Fig. 7



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UNITED STATES PATENT OFFICE.

FRANK MARSCHALEK, OF WEST NEW YORK, NEW JERSEY.

EMBROIDERY-MACHINE.

1,154,871. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed March 26, 1914. Serial No. 827,283.

To all whom it may concern:

Be it known that I, FRANK MARSCHALEK, a subject of the King of Hungary, residing at West New York, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Embroidery-Machines, of which the following is a specification.

This invention relates to embroidery machines, more particularly to that general class thereof known as Swiss embroidery machines, it being more especially adapted for use in the making of small articles, such as collars, handkerchiefs, pillow cases, etc., the size of the article varying according to the size of the frame which may be used, and is therefore not intended for use in the making of embroidery 10 and 12 yards long, as is the ordinary Swiss machine.

The object of the invention is the provision of a machine of the character described by means of which both halves of the work can be completed at the same time and by means of which a great many articles of the same kind may be made at the same time.

A further object of the invention is the provision of an improved machine of the character described in which the work frames are supported transversely of the length of the machine.

A further object of the invention is the provision of an improved machine of the character described in which the needles and and borers shiftable into and out of the work may also be shifted in transverse planes relatively to said work instead of the work being shifted relatively to the needles and borers, as in my contemporaneously pending application, Serial No. 833,595, filed April 22, 1914.

A further object of the invention is the provision of an improved machine of the character described, comprising a series of independently supported work frames and a series of sets of needles and borers so organized that each set may consist of at least two needles and two borers for each frame whereby both halves of the work may be completed at the same time.

A further object of the invention is the provision of an improved machine of the character described in which the work frames are supported in two series, one above the other, transversely of the machine, and the needles and borers are likewise supported in two series one above the other, each series consisting of a set of needles and a set of borers, whereby both halves of the work can be completed at the same time, and which borers and needles are automatically shifted into and out of the work and also manually shiftable in transverse planes relatively to the work.

In the ordinary Swiss embroidery machine, the embroidery frame is usually twelve yards long and is moved up and down and endwise by means of a pantograph, while the needles and borers are simply shiftable into and out of the work. In the present improvement, however, the work frames are located transversely of the machine and may be of any desired size according to the work to be done and if the machine is twelve yards long it will accommodate a series of work frames one set at the top and the other set at the bottom of the machine, preferably one above the other, whereby a large number of articles of similar character may be made at the same time, and in the present instance instead of shifting the frames relatively to the needles and borers the latter are shifted, in addition to their ordinary movement in and out of the work, in transverse planes relatively to the work, and in the present organization I am able to provide two needles and two borers for simultaneously working on each frame, whereby, as hereinbefore stated, both halves of a piece of work can be completed at the same time, whereas in prior machines of this general character only one needle could work at a time on an article. In short, in the present improvement each work frame has its own needles and borers and each set of needles and borers is located above another set thereof.

In the drawings accompanying and forming part of this specification, Figure 1 is a front view, partly broken away, illustrating the opposite ends of the machine; Fig. 2 is a view of the left-hand end of the machine with certain parts thereof omitted to more clearly illustrate the improvement; Fig. 3 is a top view of the machine, with certain parts omitted more clearly to illustrate the improvement; Fig. 4 is an enlarged detail view, partly in section, of the left-hand end of the machine shown in Fig. 1, taken at the right of the pantograph; Fig. 5 is a detail view of a needle and borer bar and the carrying

shafts therefor, this view being taken on line 5—5, Fig. 4; Fig. 6 is a sectional plan view taken on line 6—6, Fig. 1; Fig. 7 is an enlarged, partly sectional, view illustrating a part of the mechanism shown in Fig. 4, and this view is taken on line 7—7, Fig. 3; and Figs. 8 and 9 are detail views illustrating in part the connection between the pantograph lever system and the parts which it controls.

Similar characters of reference indicate corresponding parts in the several figures of the drawings.

The framework of the machine in the present improvement consists of four uprights, one at each corner of the machine, and each of these uprights, (see Fig. 6), consists of a substantially U-shaped post 2. These four U-shaped uprights are connected at their tops by lengthwise extending beams 3 and crosswise extending beams 4, and are similarly connected at their bottoms by lengthwise extending beams 6 and crosswise extending beams 7, thus forming a rectangular frame for the support of the various mechanisms.

The work or embroidery frames.—Carried by the framework described is a series of work frames made up of two sets, 8 and 9, one set supported above the other transversely of the length of the machine, and the frames of each set are suitably spaced apart for the positioning and operation of the needles and borers and the necessary shuttle mechanism. Each frame of a set is so supported that it may be readily removed and replaced, and as both sets of frames are supported in a similar manner—therefore a description of one supporting means will be deemed sufficient. The frames of the upper set of frames for instance are supported at their bottoms by two lengthwise extending bars 10 and at their tops by the lengthwise extending beams hereinbefore referred to, and these beams are provided with transversely extending U-shaped channels 11, (see Fig. 1), one for each work frame. Rigidly secured to each lengthwise extending supporting bar 10 at the rear of the frames is a series of lugs 12, one for each frame, each being located at the rear side thereof and against which the bottom of the frame is clamped. For this purpose each angle iron formed bar 10 carries a sliding bar 13 having a series of rigidly connected lugs 14 movable therewith and one located in position at the front of each frame, this lug being shiftable, as stated, with the sliding bar whereby it may be moved into engagement with or from the frame to release the same to permit the frame to be slid out of its guides. For shifting this shiftable lug each shiftable bar 13 is provided at its forward end with a rack in engagement with a pinion, the operation of which will move the shiftable bar and release or clamp the arms of the frames, s suitable coil spring 16 being used to draw the shiftable lugs into engagement with the fixed lugs, (see Fig. 1). The pinions for the upper set of frames and for the lower set of frames are connected by links 18 and 19 and a connecting rod 20, and on grasping the connecting rod and moving the shiftable bars the frames may be all simultaneously released or engaged.

The needle and borer mechanism.—Two series of needles and borers 30 and 31 are provided, one series above the other, and each series consists of a set of needles and a set of borers, two needles 32 and two borers 33 for each frame, so that two needles and two borers will always be working on each upper frame and a similar number of implements on each lower frame.

Extending lengthwise of the machine are two hollow parallel bearings 34, 35, which are supported for movement toward and away from each other and each of which carries at each end a pair of rollers 36, (see Figs. 4, 6 and 7), and these rollers are mounted on a supporting track 40, each having at its ends a pair of antifriction rollers 37 located in a U-shaped guideway 38 of the upright posts 2. Extending through each of these hollow bearings is a pair of shafts 41, 42, and these shafts are supported for lengthwise movement relatively to said bearing. Carried by each of the hollow bearings is a series of upwardly and downwardly extending U-shaped fixed arms 43 integrally formed with such bearings, the U-shaped arms, corresponding in number with the number of work frames, and these U-shaped arms at their lower and upper ends respectively open into enlarged portions 44 of the hollow bearings. These U-shaped arms form the guiding means for the needle and borer bars, (see for instance Fig. 3 and Fig. 5). Each of these U-shaped arms carries a needle bar and a borer bar, one of each set carrying a needle and the other a borer at its end, and the juxtaposed ends of the upper and lower needle and borer bars are secured to the shafts 41 and 42 so as to shift therewith when these shafts are moved lengthwise, the U-shaped supporting arms being of sufficient depth to permit this shifting, and when the shafts are shifted lengthwise the needles and borers are shifted into and out of the work in the usual manner. The borers of the entire series at one side of the frames are connected to one shaft, as 42, while the needles of the entire series at the same side are all connected to the other shaft, as 41. These shafts, which are slidingly mounted in the hollow bearings, project beyond the ends of such hollow bearings and the squared and shouldered ends 45 of the four shafts at each end of the machine are mounted in a slide which is in the

a link 210 which supports it between its ends, and this link 210 is in turn pivotally connected at its lower end between the converging ends of the supporting brackets. The link 209 extends back and is pivotally connected to an adjustable block settable in any desired fixed position in a vertical slot 211 carried by an upright bracket 212, (see Figs. 1 and 2), and to this bracket, which is forked at its lower end for this purpose, is secured a rack member having two sets of teeth 213 and 214, (see Fig. 8), one at each side thereof, and these rack teeth are in engagement with a pair of pinions 215 and 216 mounted on short upright shafts 217 and 218 carrying similar pinions 219 and 220 at their lower ends, (see Figs. 2 and 4). One of these shafts is shorter than the other and the pinions 219 and 220 mesh with a pair of racks 221 and 222 respectively, (see Figs. 2 and 4), which racks are formed with dovetail guiding portions 223 adapted to slide in similarly formed guides 224, which guides are formed as a part of a bracket 225, (see Fig. 4), secured to that U-shaped cross member 90 which is located at the left-hand end of the machine. This guide bracket also has bearings for the two upright short shafts. This bracket 225 has a forwardly extending portion 225′ on which is secured a horizontal slideway 230, (see Fig. 4), in which the double rack hereinbefore described can move a predetermined distance back and forth. This guideway 230 supports a pair of upwardly converging arms 231 and 232 which terminate in a pair of slotted racks 233 and 234, which racks are also supported at their rear sides by a bracket 235 which is secured at its lower end to that U-shaped member 90 which is at the left-hand end of the machine. Thus, as stated, the double faced rack 213, 214, which is secured to the lower end of the bracket 212 which is fixedly but adjustably connected to the inner end of the lever or link 209 of the pantograph, may have a sufficient movement in its slideway 230 to rotate the pinions 216 and 217 and thus shift the racks 221 and 222 to move the hollow bearings laterally in the manner about to be described.

The two racks 221 and 222 are secured to bracket arms 226 and 227, one for each rack, and the bracket arm 226 is secured to one of the hollow bearings carrying one set of shafts 41, 42, and the other bracket arm 227 is secured to the other hollow bearing carrying the other set of shafts 41, 42, the upper bracket, (see Fig. 4), being secured to that bearing which is shown at the left of Fig. 4, while the other bracket is secured to the hollow bearing shown at the right thereof, and therefore when these two racks are shifted by means of their pinions, which are shifted by the double-faced rack hereinbefore described, they will move the hollow bearings and therefore the two sets of shafts 41 and 42 on their tracks 40 hereinbefore referred to, and for which purpose the shouldered ends of the two sets of shafts 41 and 42 slide in cross members 46, which are constructed for that purpose. In other words, it will be observed that by the construction so far described the shafts 41 and 42 are shiftable lengthwise in the U-shaped cross members 90 by reason of the fact that the cross members 46 are reciprocable in the U-shaped portions of the cross members 90, while at the same time the shafts may slide laterally when the hollow bearings are shifted toward or from each other on the tracks 40 in the guideways formed in the cross members 46, which are carried within the U-shaped portions of the cross members 90, so that the shafts thus have two movements, a lengthwise movement and a crosswise movement, the lengthwise movement being within the hollow bearings and the crosswise movement being with the hollow bearings.

From the foregoing it will therefore be seen that when the pantograph is manipulated by the operator in a vertical direction it will, through the medium of the lever system and the fixed but adjustable connection of the lever 209 with the vertical slot 211, raise and lower the cross beams 90 and all the parts connected therewith, thus raising and lowering the hollow bearings and therewith the shafts 41 and 42 and the needle and borer bars, so that the needles and borers may be shifted in a vertical plane, the counterbalancing weight 93 hereinbefore described balancing these parts in such a manner as to permit this.

As hereinbefore stated, the double-faced rack 213, 214 may have a movement through the medium of the pantograph in its slide 230 to rotate the pinions and thereby the racks 221 and 222 so as to move the hollow bearings laterally or toward and from each other and thereby give the needles and borers a movement transversely of their vertical movement, and this is accomplished by providing an adjustable but relatively fixed slide 240, (see Figs. 2 and 4), adjustable up and down on the slotted racks 233 and 234 but fixed at any desired point relatively thereto by wing nuts 241, and this slide has a dovetail guideway therein in which is located a block 245 secured to or integral with the bracket 212, so that when the pantograph 200 is swung transversely of its up-and-down movement it will move the member 212 in this guide 240 and thus shift the double-faced rack at its lower end in the slideway 230 and thereby operate the pinions 216 and 217 in the manner hereinbefore described and so shift the racks 221 and 222 to move the hollow bearings and thereby the shafts carried thereby laterally and so shift the borers and needles in a path transversely

form of a transversely extending bar 46 extending across the machine. In other words, there is one of these bars 46 at the rear end and one at the forward end of the machine for supporting the series of four shafts. Each of these bars 46 is provided at its ends, at its upper and lower sides, with rollers 47, (see Figs. 6 and 7), projecting into U-shaped guides 48 of shiftable upright members 49, which members are provided at their tops and bottoms with rollers 50 mounted on tracks 51 carried by the U-shaped posts 2 of the framework, (see Figs. 4, 6 and 7).

Driving mechanism for the needles, and borers.—This comprises, (see Figs. 1 and 2) a fast pulley 60 and a loose pulley 61 mounted on a stub shaft 62, (see Fig. 1), and driven by any suitable source of power. Secured to the fast pulley 60 is an eccentric or cam 63. In engagement with this eccentric 63 is a cam roller 64, which cam roller is carried at the lower end of an upright rod 65 mounted in a suitable bracket 66 secured to the framework and between the upper and lower bearings 67 and 68 of which bracket a coil spring 69 is secured to the rod, by means of which the cam roller is maintained in engagement with the eccentric. Secured to this upright rod is a crosswise extending rod 70, and to each end of this rod 70 is attached a link 71, the opposite end of which is pivotally connected to the frame member 49 hereinbefore referred to at its lower end, the upper end of each frame member being similarly connected to a link 72 the opposite end of which is connected to a connecting rod 73, the lower end of which is secured to the rod 70, whereby on the up and down movement of the cam roller the two frame members 49 at the left-hand end of the machine will be moved back and forward on its tracks, and as it is necessary that the similar frame members at the opposite end of the machine be moved simultaneously a connecting mechanism is provided for this purpose, this consisting at the bottom of the machine of a link 75 connected to a bell crank lever 76, which in turn is connected by a rod or lever 77 with a bell crank 78 at the opposite end of the machine, which in turn is similarly connected by links 79 and 80 through the medium of a rod or shaft 81, and at the top of the machine the link 72 at the forward end and the similar link 72′ at the rear end are connected by a somewhat similar connecting mechanism comprising levers 82, 82′, bell cranks 83, 83′ and connecting lever or rod 84, the links 72′ and 80 at the rear end of the machine being in turn connected by a rod or lever 73′, whereby both frames 49, that is one at the forward end and the other at the rear end, at each side of the machine will be shifted back and forward simultaneously to slide the shafts 41 and 42 in their hollow bearings and thereby actuate the needles and borers to carry them into and out of the work.

If it is desired to stop the machine at any time when the cam roller or eccentric is at the highest point, at which time of course the spring is under its greatest tension, a lever 85 having a forked end straddling the cam carrying rod and projecting under the spring is provided. This lever carries a pawl 86 in engagement with a ratchet 87. On manipulating this lever the spring can be held at its highest point and thus free of engagement with the eccentric or cam.

Mechanism for moving the needles and borers up and down and laterally.—The two cross members 46 which support the ends of the sliding shafts at the front and rear of the machine are carried in turn by a pair of U-shaped cross members 90, one at the left and the other at the right hand end of the machine, each of which is so formed that there is sufficient play for the members 46 to slide back and forth therein so that the proper sliding movement may be given to the two sets of shafts 41 and 42. Each of these U-shaped supporting members 90, which likewise extend across the machine, (see Figs. 6 and 7), is provided at its opposite ends, at the front side, with rollers 91 projecting into U-shaped guides 92 of the U-shaped posts 2, and to each of these U-shaped members 90 is rigidly secured the supporting track 40 hereinbefore described which supports the ends of the two hollow bearings carrying the two sets of shafts 41 and 42. The supporting track 40 is provided at each end with a balancing weight 93, the cable 94 of which extends over a pulley 95, and by this means the entire system of needles and borers is properly counterbalanced.

The up and down movement of the U-shaped supports 90, and therefore of the entire system of needles and borers is obtained through the medium of a pantograph 200, which may be of the usual construction. This pantograph is supported by a pair of brackets 202, which brackets are secured to the upright posts at the left-hand end of the machine and converge toward each other, (see Fig. 3), and each of these brackets comprises a pair of arms 204 and 205, each of the arms 205 having a bearing for the shaft of the pulley 95 and a support for the bell crank 83. The pantograph lever system is suitably counterbalanced by means of a weight 203 extending over a guide pulley 203′, and which pulley is carried by an adjustable bearing 206 mounted on a standard 207. The lever system of the pantograph includes a pair of links 208 and 209, the link 208 being pivotally connected between the converging ends of the two brackets, while the link 209 is pivotally connected to

of their vertical movement. Of course, the pantograph has a certain limited operation, and if it is desired to operate say at the top or the bottom of the board or pattern the slide 240 is, by means of its ring nuts, adjusted farther up or farther down as the case may be.

The shuttle mechanism.—Suitable shuttle mechanism is provided for each set of needles and borers, and as each is a duplicate of the others a description of one is sufficient. The shuttle 250 for each needle is carried in a raceway 251 at the rear of its frame. This raceway is linked by a pair of pivoted links or levers 252 and 253 to one face of a U-shaped arm, and by means of a pair of segmental brackets 254 and 255 likewise carried by the U-shaped arm and suitable pins, the raceway may be swung into or out of position, thereby permitting ready removal of the work frames. Carried by the upper link is a segmentally formed track 256, in which is located a chain 257, and to this chain, by means of a linkage system 258, the shuttle is connected, and this chain is in turn connected at its lower end to a member 259, which is pivoted to the U-shaped arm, and this arm is provided at its forward end with a slot 260 into which projects a pin 261 projecting through a slot of the U-shaped arm, and this pin is connected with the needle bar, so that when the needle moves back and forth into or out of the work the pin operates the lever or link 259 and so shifts the chain in its segmental guideway or raceway and thereby moves the shuttle up and down, the different positions of the same shuttle being shown in Fig. 4. It will thus be seen that by this mechanism, when the needles are moved vertically or horizontally through the means hereinbefore described the entire shuttle mechanism moves therewith. Connected with this lever or link 259 is a spring presser 262 for pressing the work away from the needles when it is withdrawn.

A spool 270 is carried by each U-shaped upright, and the thread is led over an idler 271 and turned around the same once, and from thence it passes to a take-up device 272 the inner end of which is likewise connected with the chain, and this take-up device passes through a slot of the upper link 252.

As hereinbefore stated, the shuttle mechanism for each set of needles is the same, and this is true of the shuttle mechanism for the upper sets of needles, but the shuttle mechanism for the lower sets of needles, while operating the same, are slightly different in the detailed construction, but it is deemed unnecessary to further describe the same.

For braking the threads, the thread, as hereinbefore stated, passes around the idler roll once, and each idler roll has a braking mechanism, this consisting of a rod 300 suitably supported on a U-shaped arm and having at its lower end a rack 301, each of which is engaged by a pinion 302 carried by a rotatable shaft 303. This shaft is provided with a pinion 304 suitably supported, and which pinion is engaged by another pinion 305 carried by a hand wheel 306, the manipulation of which will operate all of the braking mechanisms to increase or decrease the tension on the idler rolls and thereby the tension on the threads. Each rod 300 has frictional engagement with its idler roll, for which purpose each rod is shown with its upper or lower end, as the case may be, bent into engagement with the roll. It therefore follows that, by reason of the inclination of this rod adjacent to the engagement thereof with its roll, the manipulation of the rod up or down places greater or less tension, as desired, upon the roll.

It will be understood that the various details may be changed without departing from the spirit and scope of this improvement, the present embodiment of the machine illustrating one form of mechanism which may be used for carrying out the invention, and that other means may be used in connection with the pantograph and the power for actuating the needles and borers in the manner herein shown and described, and therefore applicant does not limit himself to the specific mechanism herein shown and described for accomplishing this purpose.

I claim as my invention:

1. In a machine of the class described, the combination with supporting means, of a series of independent work supporting frames located one behind another, a series of sets of needles and borers likewise located one behind another, means for shifting the needles and borers into and out of the work, and means for shifting said needles and borers in transverse paths relatively to the frames.

2. In a machine of the class described, the combination with supporting means, of a series of independent work supporting frames located transversely of the supporting means, a series of sets of needles and borers likewise located transversely of the supporting means, means for shifting the needles and borers into and out of the work, and means for shifting said needles and borers in transverse paths relatively to the frames.

3. In a machine of the class described, the combination with supporting means, of work supporting frames carried thereby and located one behind another, a plurality of sets of needles and borers, each set comprising a plurality of needles and borers for each frame, means for shifting the needles

and borers into and out of the work, and means for shifting the needles and borers in transverse paths relatively to the work supporting frames.

4. In a machine of the class described, the combination with supporting means, of two sets of work supporting frames carried thereby, one set located above the other and the frames of each set being located one behind another, two series of needles and borers comprising two sets located one above the other, each set comprising a plurality of needles and a plurality of borers for each frame, and means for shifting the needles and borers into and out of the work.

5. In a machine of the class described, the combination with supporting means, of two sets of work supporting frames carried thereby, one set located above the other and the frames of each set being located one behind another, two series of needles and borers comprising two sets located one above the other, each set comprising a plurality of needles and a plurality of borers for each frame, and means for simultaneously shifting all of the needles and borers into and out of the work.

6. In a machine of the class described, the combination with supporting means, of two sets of work supporting frames carried thereby, one set located above the other and the frames of each set being located one behind another, two series of needles and borers comprising two sets located one above the other, each set comprising a plurality of needles and a plurality of borers for each frame, means for shifting the needles and borers into and out of the work, and means for shifting the needles and borers in transverse paths relatively to the work supporting frames.

7. In a machine of the class described, the combination with supporting means, of two sets of work supporting frames carried thereby, one set located above the other and the frames of each set being located one behind another, two series of needles and borers comprising two sets located one above the other, each set comprising a plurality of needles and a plurality of borers for each frame, means for shifting the needles and borers into and out of the work, and means for shifting all of said needles and borers simultaneously in transverse paths relatively to the work supporting frames.

8. In a machine of the class described, the combination with supporting means, of two sets of work supporting frames carried thereby and located one set above the other, the frames of each set being located one behind another, two sets of needles and borers located one set above the other and each set having a plurality of needles and a plurality of borers for each frame, power driven mechanism for shifting all of the needles and borers simultaneously into and out of the work, and manually controlled means for shifting all of the needles and borers in transverse paths relatively to the frames.

9. In a machine of the class described, the combination with supporting means, of a plurality of work supporting frames, needle and borer mechanism comprising a plurality of needles and a plurality of borers for each frame, means for shifting the same into and out of the work whereby both halves of a piece of work can be completed at the same time, and means for shifting the needles and borers in transverse paths relatively to the frames.

10. In a machine of the class described, the combination with supporting means, of one or more work carrying frames supported thereby, needle and borer mechanism for each of said frames, means for shifting the needle and borer mechanism into and out of the work, and means for raising and lowering the needle and borer mechanism and for shifting it laterally.

11. In a machine of the class described, the combination with supporting means, of one or more work carrying frames supported thereby, needle and borer mechanism for each of said frames, means for shifting the needle and borer mechanism into and out of the work, and means for raising and lowering the needle and borer mechanism and for shifting it and including a pantograph and rack and gear mechanism.

12. In a machine of the class described, the combination with supporting means, of a plurality of work frames carried thereby and located one behind another, a pair of hollow bearings carried by said supporting means for laterally shiftable movement, a pair of shafts carried by each of said bearings, a needle and borer bar secured to each of said shafts, means for raising and lowering said bearings and thereby the needle and borer bars, and means for shifting said bearings and thereby the needle and borer bars laterally.

13. In a machine of the class described, the combination with supporting means, of a plurality of work frames carried thereby and located one behind another, a pair of hollow bearings carried by said supporting means for laterally shiftable movement, a pair of shafts carried by each of said bearings, a needle and borer bar secured to each of said shafts, and means for raising and lowering said bearings and thereby the needle and borer bars and comprising a pantograph for shifting said bearings and thereby the needles and borers laterally.

14. In a machine of the class described, the combination with supporting means, of a plurality of work frames carried thereby and located one behind another, a pair of

hollow bearings carried by said supporting means for laterally shiftable movement, a pair of shafts carried by each of said bearings, a needle and borer bar secured to each of said shafts, guides secured to said bearings for the needle and borer bars, means for raising and lowering said bearings and thereby the needle and borer bars, and means for shifting said bearings and thereby the needle and borer bars laterally.

15. In a machine of the class described, the combination with supporting means, of a plurality of work frames carried thereby and located one behind another, a pair of hollow bearings carried by said supporting means for laterally shiftable movement, a pair of shafts carried by each of said bearings, a needle and borer bar secured to each of said shafts, U-shaped guides secured to said bearings for the needle and borer bars, one for each needle and borer bar, means for raising and lowering said bearings and thereby the needle and borer bars, and means for shifting said bearings and thereby the needle and borer bars laterally.

16. In a machine of the class described, the combination with supporting means, of two sets of work frames carried thereby, one set located above another and the frames of each set located one behind another, a pair of hollow bearings carried by said supporting means for laterally shiftable movement, a set of downwardly and a set of upwardly projecting guides carried by each of said hollow bearings one behind another, a pair of shafts carried by each of said bearings, a needle and borer bar located in each of said guides and secured to said shafts, all of the borers being secured to one shaft of a set and all of the needles being secured to the other shaft of the same set, and means for raising said bearings and thereby the needle and borer bars and for shifting said bearings and thereby the needle and borer bars laterally.

17. In a machine of the class described, the combination with supporting means, of two sets of work frames carried thereby, one set located above another and the frames of each set located one behind another, a pair of hollow bearings carried by said supporting means for laterally shiftable movement, a set of downwardly and a set of upwardly projecting guides carried by each of said hollow bearings one behind another, a pair of shafts carried by each of said bearings, a needle and borer bar located in each of said guides and secured to said shafts, all of the borers being secured to one shaft of a set and all of the needles being secured to the other shaft of the same set, means for raising said bearings and thereby the needle and borer bars and for shifting said bearings and thereby the needle and borer bars laterally, said means comprising a pantograph.

18. In a machine of the class described, the combination with supporting means, of two sets of work frames carried thereby, one set located above another and the frames of each set located one behind another, a pair of hollow bearings carried by said supporting means for laterally shiftable movement, a set of downwardly and a set of upwardly projecting guides carried by each of said hollow bearings one behind another, a pair of shafts carried by each of said bearings, a needle and borer bar located in each of said guides and secured to said shafts, all of the borers being secured to one shaft of a set and all of the needles being secured to the other shaft of the same set, means for raising said bearings and thereby the needle and borer bars and for shifting said bearings and thereby the needle and borer bars laterally, said means comprising a pantograph, and power-driven means for shifting the shafts lengthwise thereby to carry the needles and borers into and out of the work.

19. In a machine of the class described, the combination with supporting means, of two sets of work frames carried thereby, one set located above another and the frames of each set located one behind another, a pair of hollow bearings carried by said supporting means for laterally shiftable movement, a set of downwardly and a set of upwardly projecting guides carried by each of said hollow bearings one behind another, a pair of shafts carried by each of said bearings, a needle and borer bar located in each of said guides and secured to said shafts, all of the borers being secured to one shaft of a set and all of the needles being secured to the other shaft of the same set, means for raising said bearings and thereby the needle and borer bars and for shifting said bearings and thereby the needle and borer bars laterally, said means comprising a pantograph, power-driven means for shifting the shafts lengthwise thereby to carry the needles and borers into and out of the work, and means for stopping said power-driven means.

20. In a machine of the class described, the combination with supporting means, of two sets of work frames carried thereby, one set located above another and the frames of each set located one behind another, a pair of hollow bearings carried by said supporting means for laterally shiftable movement, a set of downwardly and a set of upwardly projecting guides carried by each of said hollow bearings one behind another, a pair of shafts carried by each of said bearings, a needle and borer bar located in each of said guides and secured to said shafts, all of the borers being secured to one shaft of a set and all of the needles being secured to the

other shaft of the same set, means for raising said bearings and thereby the needle and borer bars and for shifting said bearings and thereby the needle and borer bars laterally, said means comprising a pantograph, power-driven means for shifting the shafts lengthwise thereby to carry the needles and borers into and out of the work, and shuttle mechanism for the needles and connected therewith whereby on the shifting of the needles in the plane of the work frames the shuttle mechanism will be shifted therewith.

21. In a machine of the class described, the combination with a supporting framework, of a plurality of work frames carried thereby and located one behind another, a pair of cross members shiftable vertically relatively to said framework, a pair of sliding cross members carried by said first cross members and shiftable transversely thereof, a pair of tracks connected with said first cross members and movable therewith, one or more hollow bearings shiftable laterally on said tracks, a pair of shafts carried by each of said hollow bearings and connected with said sliding cross members for movement therewith and for lateral movement independently thereof, a needle bar secured to one of said shafts and a borer bar secured to the other of said shafts, means for raising and lowering the first pair of cross members, means for transversely shifting the sliding set of cross members, and means for shifting said bearings laterally on their tracks.

22. In a machine of the class described, the combination with a supporting framework, of a plurality of work frames carried thereby and located one behind another, a pair of cross members shiftable vertically relatively to said framework, a pair of sliding cross members carried by said first cross members and shiftable transversely thereof, upright frames movable with said sliding cross members and having guideways for supporting the same when shiftable with the first cross members in a vertical path, a pair of tracks connected with said first cross members and movable therewith, one or more hollow bearings shiftable laterally on said tracks, a pair of shafts carried by each of said hollow bearings and connected with said sliding cross members for movement therewith and for lateral movement independently thereof, a needle bar secured to one of said shafts and a borer bar secured to the other of said shafts, means for raising and lowering the first pair of cross members, power-driven means connected with said upright frames for shifting the same and thereby the sliding pair of cross members transversely of the first pair of cross-members, and means for shifting said bearings laterally on their tracks.

23. In a machine of the class described, the combination with a supporting framework, of a plurality of work frames carried thereby and located one behind another, a pair of cross members shiftable vertically relatively to said framework, a pair of sliding cross members carried by said first cross members and shiftable transversely thereof, a pair of tracks connected with said first cross members and movable therewith, one or more hollow bearings shiftable laterally on said tracks, a pair of shafts carried by each of said hollow bearings and connected with said sliding cross members for movement therewith and for lateral movement independently thereof, a needle bar secured to one of said shafts and a borer bar secured to the other of said shafts, power-driven means for shifting said sliding cross members and thereby the shafts lengthwise thereof, and a pantograph for raising and lowering said first cross members and for shifting each of said hollow bearings laterally.

24. In a machine of the class described, the combination with a supporting framework, of a plurality of work frames carried thereby and located one behind another, a pair of cross members shiftable vertically relatively to said framework, a pair of sliding cross members carried by said first cross members and shiftable transversely thereof, a pair of tracks connected with said first cross members and movable therewith, one or more hollow bearings shiftable laterally on said tracks, a pair of shafts carried by each of said hollow bearings and connected with said sliding cross members for movement therewith and for lateral movement independently thereof, a needle bar secured to one of said shafts and a borer bar secured to the other of said shafts, power-driven means for shifting said sliding cross members and thereby the shafts lengthwise thereof, and a pantograph for raising and lowering said first cross members and for shifting each of said hollow bearings laterally, said pantograph including a lever system having an adjustable settable means between such lever system and one of said cross members and each of said hollow bearings.

25. In a machine of the class described, the combination with a supporting framework, of a plurality of work frames carried thereby and located one behind another, a pair of cross members shiftable vertically relatively to said framework, a pair of sliding cross members carried by said first cross members and shiftable transversely thereof, a pair of tracks connected with said first cross members and movable therewith, one or more hollow bearings shiftable laterally on said tracks, a pair of shafts carried by each of said hollow bearings and connected with said sliding cross members for movement therewith and for

lateral movement independently thereof, a needle bar secured to one of said shafts and a borer bar secured to the other of said shafts, power-driven means for shifting said sliding cross members and thereby the shafts lengthwise thereof, and a pantograph for raising and lowering said first cross members and for shifting each of said hollow bearings laterally, said pantograph including a lever system having connection with one of said first cross members and with each of said hollow bearings.

26. In a machine of the class described, the combination with a supporting framework, of a plurality of work frames carried thereby and located one behind another a pair of cross members shiftable vertically relatively to said framework, a pair of sliding cross members carried by said first cross members and shiftable transversely thereof, a pair of tracks connected with said first cross members and movable therewith, one or more hollow bearings shiftable laterally on said tracks, a pair of shafts carried by each of said hollow bearings and connected with said sliding cross members for movement therewith and for lateral movement independently thereof, a needle bar secured to one of said shafts and a borer bar secured to the other of said shafts, power-driven means for shifting said sliding cross members and thereby the shafts lengthwise thereof, a pantograph for raising and lowering said first cross members and for shifting each of said hollow bearings laterally, said pantograph including a lever system having connection with one of said first cross members and with each of said hollow bearings, and means for counterbalancing the needle and borer bar supporting means.

27. In a machine of the class described, the combination with a supporting framework, of a plurality of work frames carried thereby and located one behind another, a pair of cross members shiftable vertically relatively to said framework, a pair of sliding cross members carried by said first cross members and shiftable transversely thereof, a pair of tracks connected with said first cross members and movable therewith, one or more hollow bearings shiftable laterally on said tracks, a pair of shafts carried by each of said hollow bearings and connected with said sliding cross members for movement therewith and for lateral movement independently thereof, a needle bar secured to one of said shafts and a borer bar secured to the other of said shafts, power-driven means for shifting said sliding cross members and thereby the shafts lengthwise thereof, and a pantograph for raising and lowering said first cross members and for shifting each of said hollow bearings laterally, said pantograph including a lever system having connection with one of said first cross members and with each of said hollow bearings, said connection including rack and pinion mechanism.

28. In a machine of the class described, the combination with a supporting framework, of a plurality of work frames carried thereby and located one behind another, a pair of cross members shiftable vertically relatively to said framework, a pair of sliding cross members carried by said first cross members and shiftable transversely thereof, a pair of tracks connected with said first cross members and movable therewith, a pair of hollow bearings shiftable laterally on said tracks, a pair of shafts carried by each of said hollow bearings and connected with said sliding cross members for movement therewith and for lateral movement independently thereof, a needle bar secured to one of said shafts and a borer bar secured to the other of said shafts, power-driven means for shifting said sliding cross members and thereby the shafts lengthwise thereof, and a pantograph for raising and lowering said first cross members and for shifting each of said hollow bearings laterally, said pantograph including a lever system having connection with one of said first cross members and with each of said hollow bearings, said connection comprising a double-faced rack, two sets of pinions, a pair of racks and means connecting each of said racks with a hollow bearing.

29. In a machine of the class described, the combination with a supporting framework, of a plurality of work frames carried thereby and located one behind another, a pair of cross members shiftable vertically relatively to said framework, a pair of sliding cross members carried by said first cross members and shiftable transversely thereof, a pair of tracks connected with said first cross members and movable therewith, one or more hollow bearings shiftable laterally on said tracks, a pair of shafts carried by each of said hollow bearings and connected with said sliding cross members for movement therewith and for lateral movement independently thereof, a needle bar secured to one of said shafts and a borer bar secured to the other of said shafts, power-driven means for shifting said sliding cross members and thereby the shafts lengthwise thereof, and a pantograph for raising and lowering said first cross members and for shifting each of said hollow bearings laterally, said pantograph including a lever system having connection with one of said first cross members and with each of said hollow bearings, said connection including an upright bracket, a lever vertically adjustable relatively thereto and means for supporting said bracket for lateral movement.

30. In a machine of the class described, the combination with a supporting frame-

work, of a plurality of work frames carried thereby and located one behind another, a pair of cross members shiftable vertically relatively to said framework, a pair of sliding cross members carried by said first cross members and shiftable transversely thereof, a pair of tracks connected with said first cross members and movable therewith, one or more hollow bearings shiftable laterally on said tracks, a pair of shafts carried by each of said hollow bearings and connected with said sliding cross members for movement therewith and for lateral movement independently thereof, a needle bar secured to one of said shafts and a borer bar secured to the other of said shafts, power-driven means for shifting said sliding cross members and thereby the shafts lengthwise thereof, and a pantograph for raising and lowering said first cross members and for shifting each of said hollow bearings laterally, said pantograph including a lever system having connection with one of said first cross members and with each of said hollow bearings, said connection including an upright bracket, a lever vertically adjustable relatively thereto and means for supporting said bracket for lateral movement, said last means comprising a slide and an upright bracket secured to one of said cross members.

31. In a machine of the class described, the combination with a supporting framework, of a plurality of work frames carried thereby and located one behind another, a pair of cross members shiftable vertically relatively to said framework, a pair of sliding cross members carried by said first cross members and shiftable transversely thereof, a pair of tracks connected with said first cross members and movable therewith, a pair of hollow bearings shiftable laterally on said tracks, a pair of shafts carried by each of said hollow bearings and connected with said sliding cross members for movement therewith and for lateral movement independently thereof, a needle bar secured to one of said shafts and a borer bar secured to the other of said shafts, power-driven means for shifting said sliding cross members and thereby the shafts lengthwise thereof, and a pantograph for raising and lowering said first cross members and for shifting each of said hollow bearings laterally, said pantograph including a lever system having connection with one of said first cross members and with each of said hollow bearings, said connection including an upright bracket, a lever vertically adjustable relatively thereto and means for supporting said bracket for lateral movement, said last means comprising a slide and an upright bracket secured to one of said cross members, a double-faced rack carried by said bracket, a pair of pinions in engagement therewith, a pair of racks secured one to each of said hollow bearings, a pair of pinions connected with said first pinions for engaging said last pair of racks, and means carried by one of said first cross members for supporting said last pair of racks and pinions.

32. In a machine of the class described, the combination with a supporting framework, of a plurality of work frames carried thereby and located one behind another, a pair of cross members shiftable vertically relatively to said framework, a pair of sliding cross members carried by said first cross members and shiftable transversely thereof, a pair of tracks connected with said first cross members and movable therewith, a pair of hollow bearings shiftable laterally on said tracks, a pair of shafts carried by each of said hollow bearings and connected with said sliding cross members for movement therewith and for lateral movement independently thereof, needle and borer bars secured to said shafts, means secured to said bearings for guiding said bars, power-driven means for shifting said sliding cross members and thereby the shafts lengthwise thereof, and a pantograph for raising and lowering said first cross members and for shifting each of said hollow bearings laterally, said pantograph including a lever system having connection with one of said first cross members and with each of said hollow bearings, said connection including an upright bracket, a lever vertically adjustable relatively thereto and means for supporting said bracket for lateral movement, said last means comprising a slide and an upright bracket secured to one of said cross members, a double-faced rack carried by said bracket, a pair of pinions in engagement therewith, a pair of racks secured one to each of said hollow bearings, a pair of pinions connected with said first pinions for engaging said last pair of racks, and means carried by one of said first cross members for supporting said last pair of racks and pinions.

33. In a machine of the class described, the combination with supporting means, of a series of work supporting means each of substantially the width of and arranged transversely of the length of said supporting means and carried thereby and located one behind another, a series of sets of needle and borer means for said work supporting means and likewise located one behind another, mechanism for shifting the needle and borer means into and out of the work, means for shifting one of said means in transverse paths relatively to the other, and shuttle mechanism for each of the needles and likewise shiftable in transverse paths.

34. In a machine of the class described, the combination with supporting means, of

a plurality of work supporting means carried thereby and located one behind another, a plurality of sets of needle and borer means for said work supporting means and likewise located one behind another, mechanism for shifting the needle and borer means into and out of the work, means for shifting one of said means in transverse paths relatively to the other, shuttle mechanism for each of the needles and likewise shiftable in transverse paths, and means connecting the shuttle mechanism with its needle whereby on the shifting of the needle in transverse paths its shuttle mechanism is similarly shifted.

35. In a machine of the class described, the combination with supporting means, of a work supporting frame, needle and borer mechanism therefor, and shuttle mechanism comprising an adjustable raceway, a segmental guideway carried thereby, flexible means located therein and connected with the shuttle mechanism, and means connecting said flexible means with the needle whereby on the operation thereof the shuttle mechanism will be operated.

36. In a machine of the class described, the combination with supporting means, of a work supporting frame, needle and borer mechanism therefor, shuttle mechanism comprising an adjustable raceway, a segmental guideway carried thereby, flexible means located therein and connected with the shuttle mechanism, means connecting said flexible means with the needle whereby on the operation thereof the shuttle mechanism is similarly shifted, work pressing means connected with said last means.

37. In a machine of the class described, the combination with work supporting means, of a work frame supported thereby, needle and borer mechanism therefor, and shuttle mechanism comprising a segmental guideway, flexible means therein, means connected therewith and with the shuttle of the shuttle mechanism and means connected with said flexible means and with the needle for operating the shuttle.

38. In a machine of the class described, the combination with supporting means, of a plurality of work supporting means carried thereby and located one behind another, a plurality of sets of needle and borer means for said work supporting means and likewise located one behind another, mechanism for shifting the needle and borer means into and out of the work, means for shifting one of said means in transverse paths relatively to the other, shuttle mechanism for each of the needles and likewise shiftable in transverse paths, thread supply means, and means for braking said thread supply means.

39. In a machine of the class described, the combination with supporting means, of a plurality of work supporting means carried thereby and located one behind another, a plurality of sets of needle and borer means for said work supporting means and likewise located one behind another, mechanism for shifting the needle and borer means into and out of the work, means for shifting one of said means in transverse paths relatively to the other, shuttle mechanism for each of the needles and likewise shiftable in transverse paths, means connecting the shuttle mechanism with its needle whereby on the shifting of the needle in transverse paths its shuttle mechanism is similarly shifted, thread supply means, and means for braking said thread supply means.

40. In a machine of the class described, the combination with supporting means, of a work supporting frame, needle and borer mechanism therefor, shuttle mechanism comprising an adjustable raceway, a segmental guideway carried thereby, flexible means located therein and connected with the shuttle mechanism, means connecting said flexible means with the needle whereby on the operation thereof the shuttle mechanism will be operated, thread supply means, and means for braking said thread supply means.

41. In a machine of the class described, the combination with supporting means, of a work supporting frame, needle and borer mechanism therefor, shuttle mechanism comprising an adjustable raceway, a segmental guideway carried thereby, flexible means located therein and connected with the shuttle mechanism, means connecting said flexible means with the needle whereby on the operation thereof the shuttle mechanism will be operated, work pressing means connected with said last means, thread supply means, and means for braking said thread supply means.

42. In a machine of the class described, the combination with work supporting means, of a work frame supported thereby, needle and borer mechanism therefor, shuttle mechanism comprising a segmental guideway, flexible means therein, means connected therewith and with the shuttle of the shuttle mechanism, means connected with said flexible means and with the needle for operating the shuttle, thread supply means, and means for braking said thread supply means.

43. In a machine of the class described, the combination with supporting means of a plurality of work supporting means carried thereby and located one behind another, a plurality of sets of needle and borer means for said work supporting means and likewise located one behind another, mechanism for shifting the needle and borer means into and out of the work, means for

shifting one of said means in transverse paths relatively to the other, shuttle mechanism for each of the needles and likewise shiftable in transverse paths, thread supply means for each of said shuttle mechanisms, means for braking each of said thread supply means, and means for operating all of said thread supply means simultaneously.

44. In a machine of the class described, the combination with supporting means, of a plurality of work supporting means carried thereby and located one behind another, a plurality of sets of needle and borer means for said work supporting means and likewise located one behind another, mechanism for shifting the needle and borer means into and out of the work, means for shifting one of said means in transverse paths relatively to the other, shuttle mechanism for each of the needles and likewise shiftable in transverse paths, means connecting the shuttle mechanism with its needle whereby on the shifting of the needle in transverse paths its shuttle mechanism is similarly shifted, thread supply means for each of said shuttle mechanisms, means for braking each of said thread supply means, and means for operating all of said thread supply means simultaneously.

45. In a machine of the class described, the combination with supporting means, of a plurality of sets of work supporting frames carried thereby, one set located above another and the frames of each set being located one behind another, two series of needles and borers for said frames, one series located above another and each series comprising a plurality of sets one located behind another and each set comprising a plurality of needles and borers whereby both halves of a piece of work may be completed at the same time, mechanism for shifting the needles and borers into and out of the work simultaneously, means for shifting all of said needles and borers in transverse paths relatively to the frame, shuttle mechanism for each of the needles, means connecting said shuttle mechanism with the needle whereby it is likewise shiftable in transverse paths, thread supply means for each of the shuttle mechanisms, means for braking each of the thread supply means, and means for operating all of said braking means simultaneously.

Signed at New York, in the county of New York and State of New York, this 24th day of March, 1914.

FRANK MARSCHALEK.

Witnesses:
F. E. BOYCE,
WALTER L. BAKELAR.