J. KRÜSI.

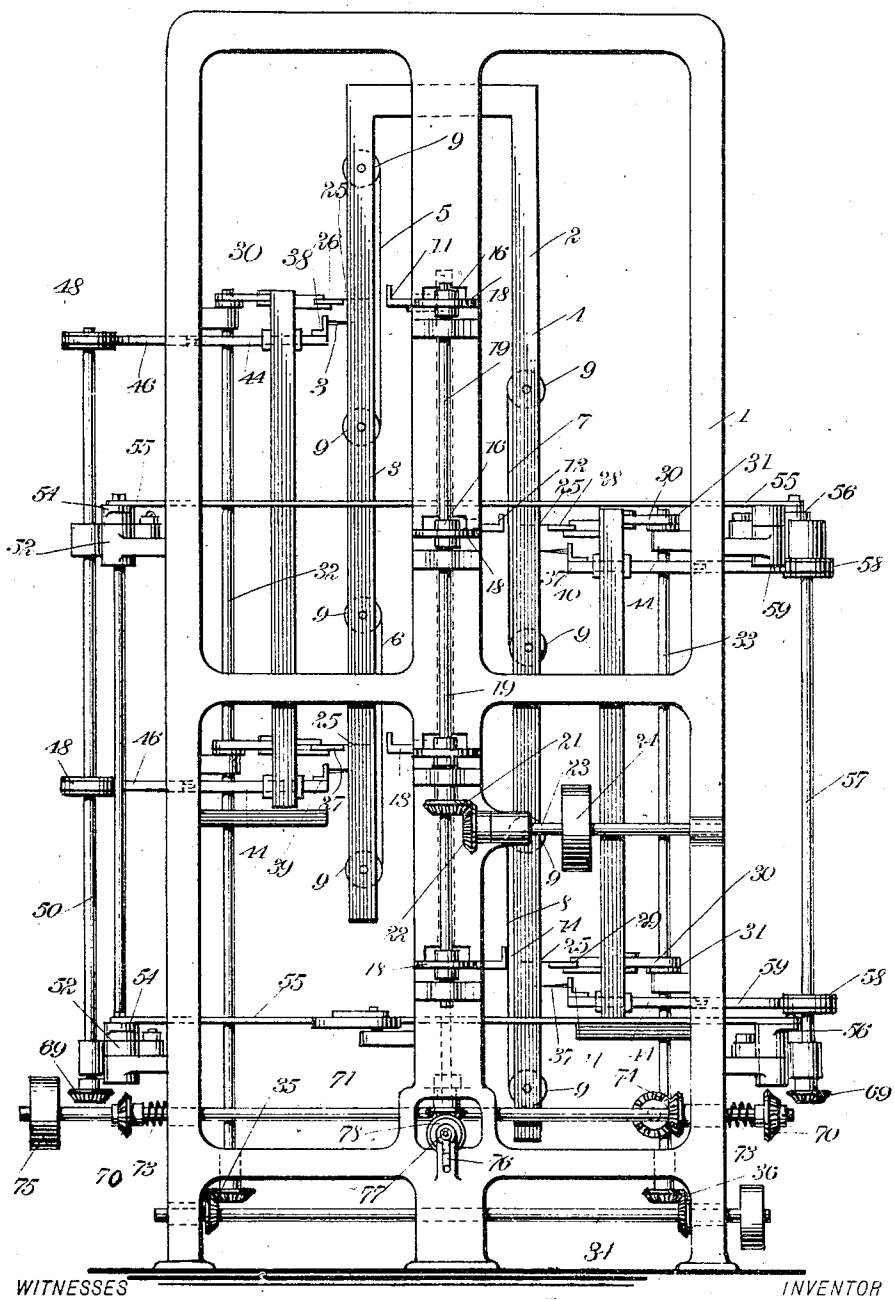
SHUTTLE EMBROIDERING MACHINE.

APPLICATION FILED APR. 1, 1911.

1,017,422.

Patented Feb. 13, 1912.

3 SHEETS—SHEET 1.



WITNESSES

INVENTOR

Fig. 1

BY

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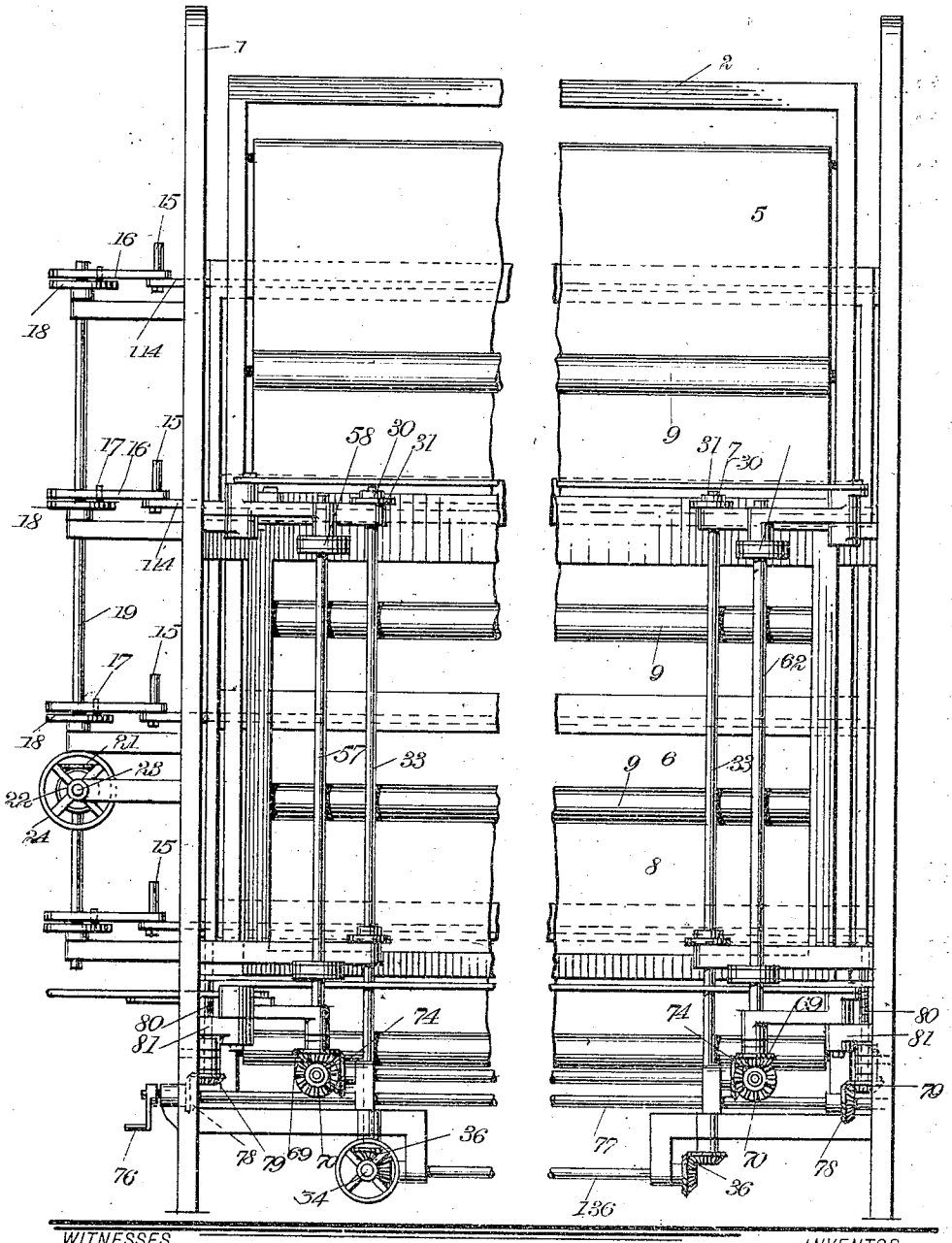

Fig. 2

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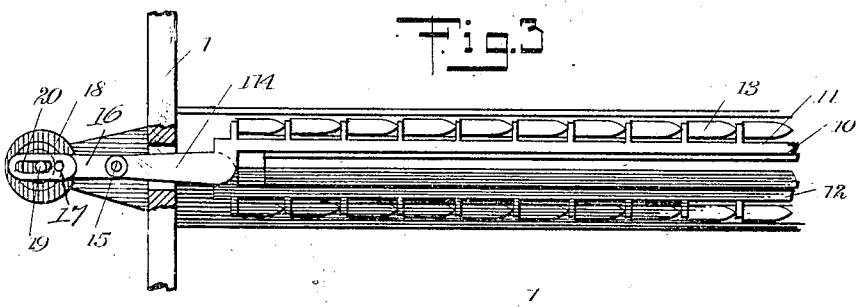
3 SHEETS—SHEET 3.

Fig. 3



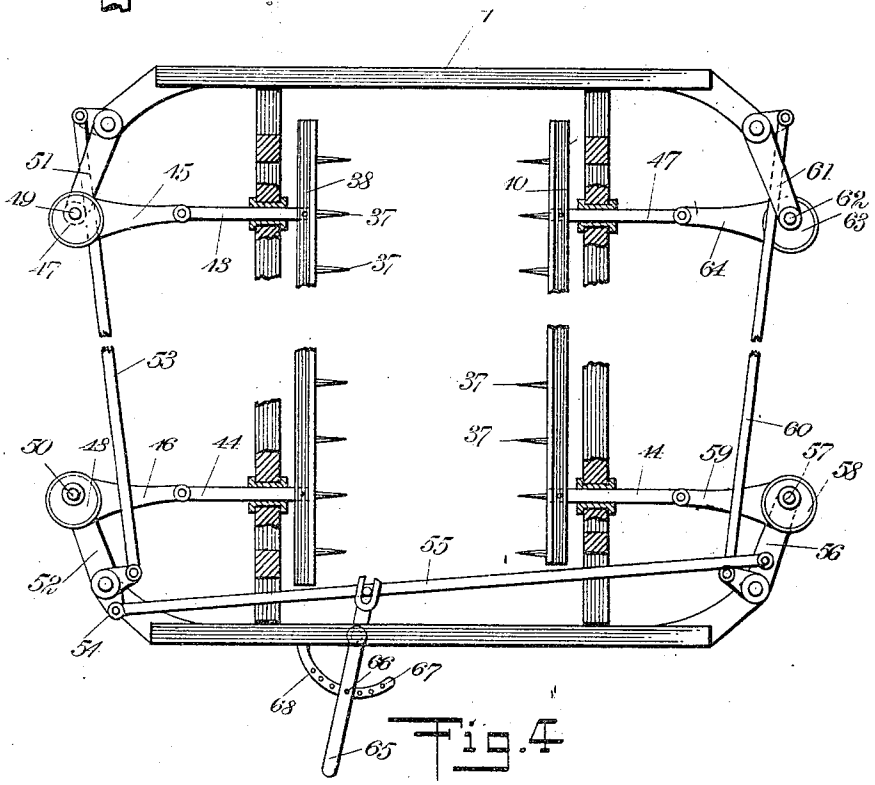
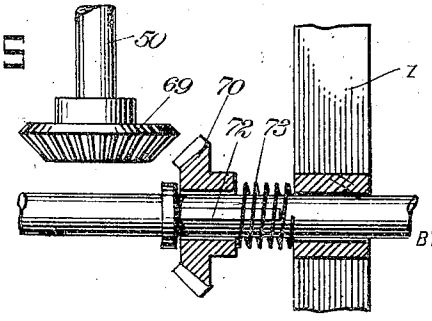


Fig. 4

Fig. 5



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UNITED STATES PATENT OFFICE.

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SHUTTLE EMBROIDERING-MACHINE.

1,017,422. Specification of Letters Patent. Patented Feb. 13, 1912.

Application filed April 1, 1911. Serial No. 618,320.

To all whom it may concern:

Be it known that I, JOHN KRUSI, 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 Shuttle Embroidering-Machine, of which the following is a full, clear, and exact description.

This invention relates to a new and improved embroidering machine of the shuttle type, which is adapted to embroider on a plurality of strips of fabric simultaneously.

While it has been possible in the past to embroider on two separate strips of fabric, no machine has been found which is practical that will embroider a greater number of strips of fabric than two with any degree of success.

An object, therefore, of this invention is to provide a device which will embroider not only a plurality of strips of fabric in the same vertical plane, but also a plurality of strips of fabric in different vertical planes.

Another object of this invention is to provide means for supporting a plurality of strips of fabric in different planes in vertical staggered spaced relation, whereby access may be had conveniently to the different strips of fabric, and with means for embroidering on all of said strips of fabric simultaneously.

A further object of this invention is to provide an embroidering machine in which the shuttle elements are interposed between a plurality of strips of fabric, with the needle elements disposed outside of the strips of fabric and coöperating with the shuttle elements.

A still further object of this invention is to provide a shuttle embroidering machine with borers for removing portions of the fabric with means for displacing the shuttle elements during the boring operation, and driving connections for allowing for this displacement.

These and further objects, together with the construction and combination of parts, will be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is an end view in elevation; Fig. 2 is a contracted side view in elevation; Fig. 3 is a detail view of some of the shuttle elements; Fig. 4 is a horizontal section showing the mechanism for manipulating the boring elements; and Fig. 5 is a detail view of the mechanism for driving the boring elements.

Referring more particularly to the separate parts of this invention as embodied in the form shown in the drawings, 1 indicates a main supporting frame, on which is floatingly supported in any suitable manner, such as is common in various types of embroidering machines, a fabric frame 2. This fabric frame is peculiar, in that it is provided with a plurality of vertical reaches 3 and 4, each of which is adapted to support one or more strips of fabric, and in the case of a plurality, the strips will be vertically spaced. As shown in the drawings, I have provided two strips of fabric on each reach, and have indicated the strips of fabric by the numerals 5, 6, 7 and 8. The strips of fabric are supported on the frame in stretched condition, by means of rollers 9, arranged in pairs. It is to be noted that the rollers are so arranged that the strips of fabric on the reach 3 will be staggered relative to the strips of fabric on the reach 4; that is to say, the strips of fabric 7 and 8 are disposed in alinement with the spaces between and to the side of the strips of fabric 5 and 6. The purpose of this is to permit any one of the strips of fabric to be accessible without interfering with the others, so that in case of breakage of thread or the like, the damage can be readily ascertained and repaired. In this form of my device, I have located the shuttle elements in between the strips of fabric in different vertical planes, that is to say, I have disposed them between the reaches 3 and 4. In this instance, I show the shuttle mechanism in the form of a movable frame 10, having shuttle bars 11, 12, 13 and 14, one for each strip of fabric and arranged in staggered vertically-spaced relation on the frame 10. On each of these bars, there is provided a plurality of shuttles of any suitable type, the number varying with the number of needles to be used and the number of reproductions of the design to be made on each strip of fabric.

In order to operate the shuttle bars 11 to 14, and thus the shuttles, these bars are provided with arms 114, which are provided with vertically-disposed pins 15, which en-

gage in vertical openings in links 16. This arrangement is for the purpose of allowing the vertical movement of the shuttle frame without disturbing the drive of the shuttle bars, which is utilized for a purpose to be described hereinafter. The links 16 are provided with pins 17, which engage in cam grooves provided in cams 18 disposed on a shaft 19. For the purpose of guiding the motion of the links 16, these links are provided with slots 20, which engage the shaft 19, and thus prevent any wabbling, and at the same time hold the pins 17 in the cam grooves.

The shaft 19 may be driven in any suitable manner, as by being provided with a bevel gear 21, which meshes with a corresponding bevel gear 22 on a shaft 23, which may be driven from any suitable source of power, as indicated by a belt pulley 24.

Coöperating with the shuttles on the staggered bars, there are provided a series of needles 25, one for each shuttle. These needles are arranged in horizontal series on needle bars 26, 27, 28 and 29, one for each strip of fabric. The needle bars 26 to 29 may be driven in unison in any suitable manner, as by having links 30 at each end, engaging cams 31 on cam shafts 32 and 33. The cams 31 are similar to the cams 18 above mentioned and shown in detail in Fig. 3, that is, each cam 31 is provided with a cam groove engaged by a pin on the corresponding link 30 so that when the cams 31 are rotated a reciprocating motion is given to the needle bars 26, 27, 28 and 29. The cam shafts 32 and 33 are connected at their lower ends by intermeshing bevel gear wheels 35 and 36 with shafts 34 (see Fig. 1) of which one is provided with a pulley driven by belt from other machinery, and bevel gear wheels on a shaft 136 (see Fig. 2) meshing with the bevel gear wheels on the shafts 33, so that when the shaft 34 is driven the shafts 32 and 33 are rotated in unison.

In order to increase the artistic effect of the embroidered fabric, it is often desirable to produce apertures therein, so as to have an openwork effect. For this purpose, I have provided series of borers 37, connected to boring bars and forming the boring elements 38, 39, 40 and 41 corresponding to each of the strips of fabric. These boring elements; that is to say, the boring bars therefor, as will be seen by reference to Fig. 4, are provided with horizontally-disposed shafts 43 and 44, slidingly mounted in the frame, so as to permit the movement of each of the boring bars uniformly at both ends. In the case of the boring elements 38 and 39, the shafts 43 and 44 are pivotally connected to eccentric rods 45 and 46, which are given motion by means of eccentrics 47 and 48, secured to shafts 49 and 50. The shafts 49 and 50 are rotatably mounted on pairs of bell crank levers 51 and 52 which are pivoted to the frame or support 1. These bell crank levers are connected by a link 53 so as to move in unison. The bell crank levers 52 are provided with arms 54, to which are connected rods 55, which in turn are connected to similar bell crank levers 56 on the opposite side of the support 1. The bell crank levers 56 support a shaft 57, which operates a plurality of eccentrics 58, one for each of the boring elements 40 and 41, through the intermediary of eccentric links 59. Similarly, to the opposite side, the bell crank levers 56 are connected by links 60 to bell crank levers 61, so as to move a shaft 62 in unison with the shaft 57. The shaft 62 has also eccentrics 63, one for each of the boring elements 40 and 41, which are operatively connected to the shafts 43 by eccentric rods 64. The rod 55 may be adjusted by a lever 65, and locked in any adjusted position by means of a pin 66, which is adapted to engage in one of a plurality of openings 67 in an arcuate lock bar 68.

It will be seen by manipulation of the lever 65 that the boring elements on both sides of the floating fabric frame 2 may be swung in unison toward or from the strips of fabric. The shafts 49, 50 and 62 and 57 are provided on their lower ends with bevel gears 69, which mesh with bevel gears 70 on shafts 71. The connection of the bevel gears 70 to the shafts 71 will be seen by reference to Fig. 5. The bevel gears 70 are connected by means of a spline 72, so that each one is free to slide on its shaft against the tension of a spring 73. It will thus be seen that by manipulating the lever 65 four gears 69 will be swung into engagement with the four gears 70, and thus be driven from the shafts 71, which are connected by gearing 74, so as to be driven in unison from a common source of power 75, which is indicated by a belt pulley on one of the shafts 71. If the gears 69 are only just forced into engagement with the gear 70, they will form a driving connection between the main drive and the boring elements 38 to 41, so that the latter will be reciprocated in the strips of fabric 5 to 8 and produce a hole of minimum size. If, however, the lever 65 is manipulated a sufficient distance to compress the spring 73, the borers 37 will be brought closer to the strips of fabric, and, inasmuch as these borers are tapered, they will produce openings of greater or less extent, according to the amount which the springs 73 are compressed.

When the boring mechanism is in operation, it is desirable that the shuttle bars and the shuttles thereon should be drawn out of coöperative alinement with the needles. For this purpose, the shuttle frame is lowered by

turning a crank 76, which rotates a shaft 77, having bevel gears 78 thereon, which mesh with bevel gears 79 on screw-jack shafts 80, engaging in screw-threaded openings in the shuttle frame, as at 81. When the boring operation is finished, the crank may be rotated in the opposite direction, returning the shuttle frame and the shuttles to their original position in opposition to the needles.

The operation of the device will be readily understood when taken in connection with the above description. When it is desired to embroider on the various strips of fabric, the floating fabric frame 2 is manipulated as is common in such types of embroidering machines, by means of a pantograph (not shown), so as to follow the predetermined design. The needles 25 are driven by the mechanism so as to coöperate with the shuttles 13, thereby not only reproducing on each fabric a plurality of representations of the same design, but reproducing this design on several strips of fabric, not only in the same plane but in different vertical planes. When it is desired to bore openings in the fabric, the shuttle frame is lowered by manipulating the crank 76, and the gears 69 swung into engagement with the gears 70 by manipulating the lever 65, the extent of movement of which will control the size of the opening.

It will thus be seen that there is provided a simple and efficient machine, in which the shuttles are located between the reaches of the floating frame and coöperate with the needles to produce a plurality of copies of the same design on a plurality of strips of fabric located in the same and different planes, and it will be further seen that all of the mechanism is simple and readily accessible, so that the device may work smoothly and efficiently.

While I have shown one embodiment of my invention, I do not wish to be limited to the specific details thereof, but desire to be protected in various changes, alterations and modifications which may come within the scope of the appended claims.

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

1. The combination with a supporting frame for supporting a plurality of strips of fabric arranged in different vertical planes, or shuttle mechanism interposed between said strips of fabric, needle elements coöperating with said shuttle mechanism, arranged on the opposite sides of said strips of fabric from said shuttle mechanism, means for driving said needle elements, boring mechanism adapted to produce openings in said strip of fabric, said shuttle mechanism being movable into and out of coöperative relation with said needle elements, and means for manipulating said shuttle mechanism so as to be out of coöperation with said needle elements when said boring mechanism is in action.

2. The combination with a floating fabric frame, of means for supporting a plurality of strips of fabric on said frame in staggered spaced relation, a shuttle frame interposed between strips of said fabric, shuttle bars movably mounted on said frame in staggered vertically-shaped relation, means for manipulating said shuttle bars, needle elements disposed on opposite sides of said fabrics from said shuttle frame and arranged in vertical spaced relation and staggered relative to each other so as to coöperate with said shuttle bars, and means for driving said needle elements.

3. The combination with a floating fabric frame having a plurality of reaches adapted to support a plurality of strips of fabric in different vertical planes, of a shuttle frame interposed between the reaches of said fabric frame, means for moving said shuttle frame in a vertical direction, a plurality of shuttle bars on said shuttle frame, and means for moving said shuttle bars in a horizontal direction.

4. The combination with a floating fabric frame having a plurality of reaches adapted to support a plurality of strips of fabric in different vertical planes, of a shuttle frame interposed between the reaches of said fabric frame, means for moving said shuttle frame in a vertical direction, a plurality of shuttle bars on said shuttle frame, means for moving said shuttle bars in a horizontal direction, shuttles on said shuttle bars, and means for driving said shuttles, having a loose connection adapted to maintain the driving connection between said shuttle bars and said driving means, irrespective of the vertical position of said shuttle frame.

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

JOHN KRUSI.

Witnesses:
H. Whiting,
Philip D. Rollhaus.