M. SCHOENFELD.

SHUTTLE MECHANISM FOR EMBROIDERING MACHINES.

APPLICATION FILED FEB. 16, 1910.

991,656. Patented May 9, 1911.

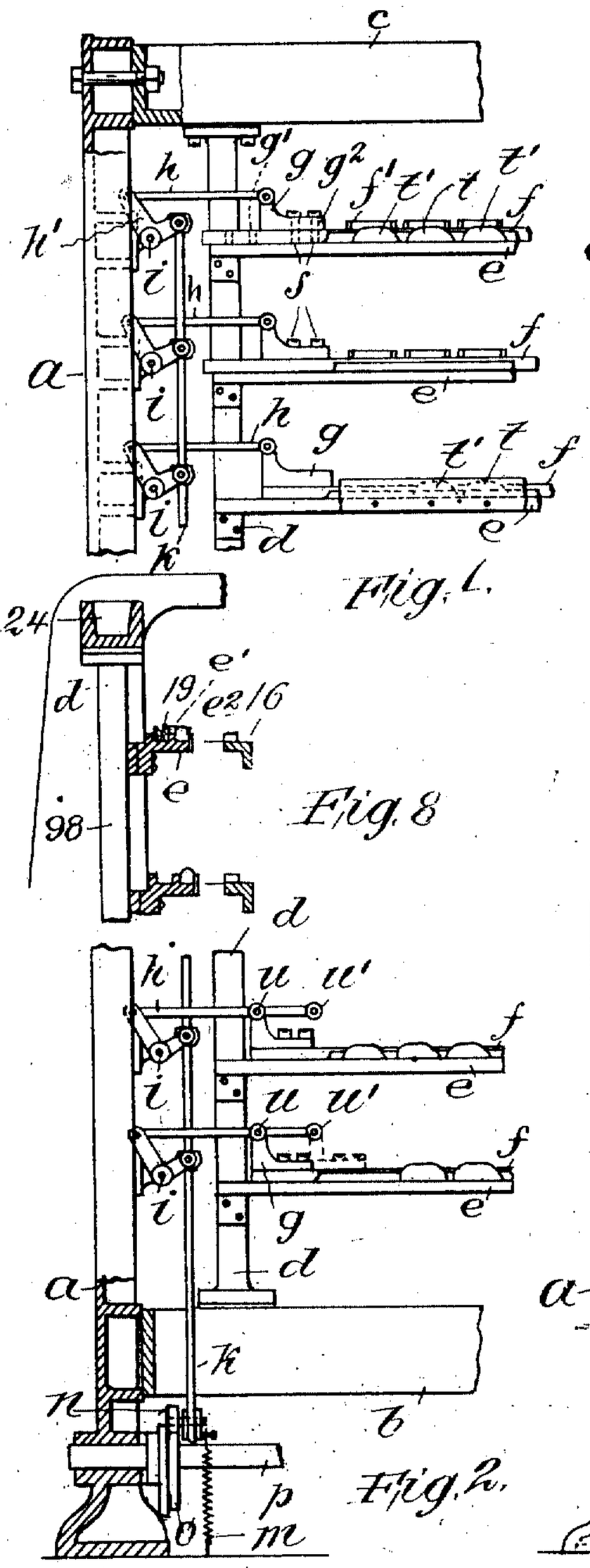

Fig. 1.

Fig. 2.

Fig. 8

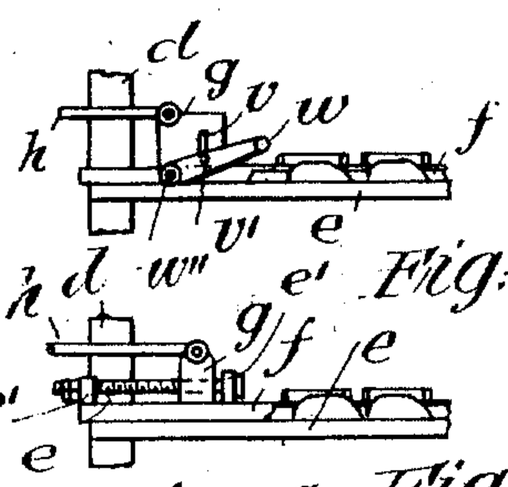

Fig. 4.

Fig. 5.

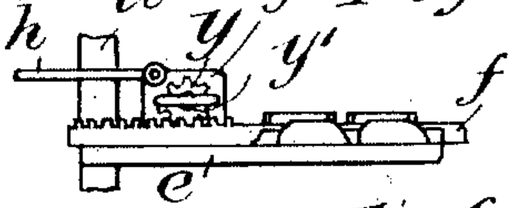

Fig. 6.

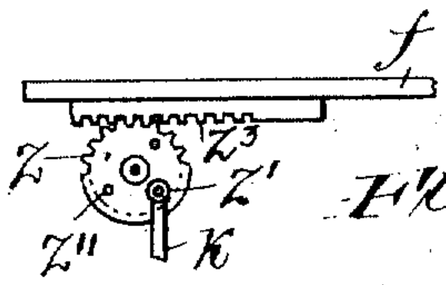

Fig. 7.

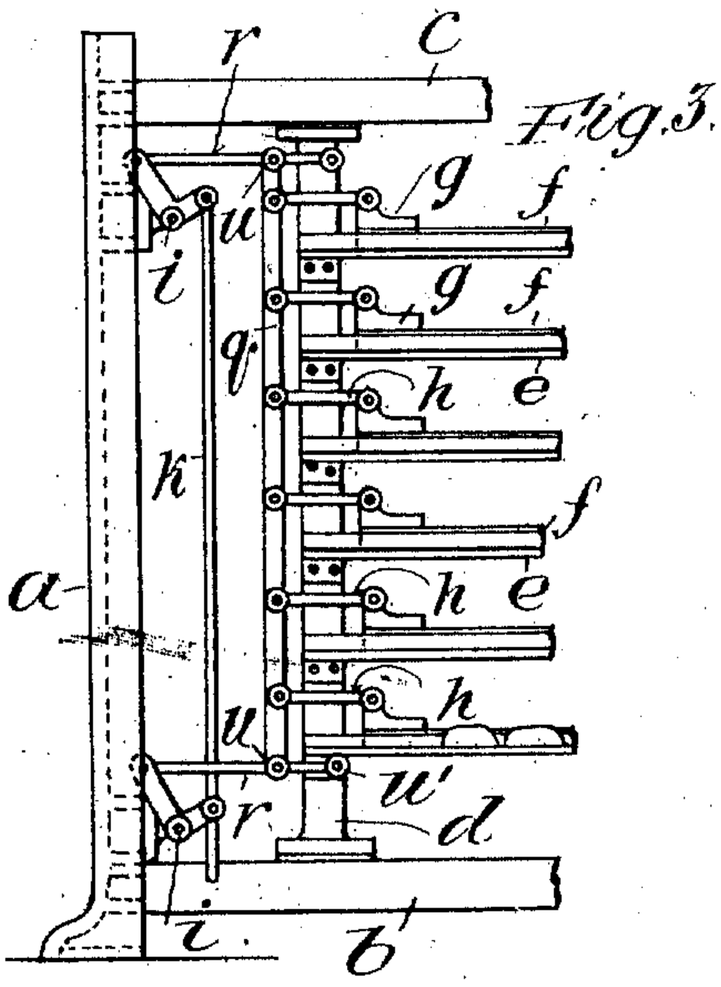

Fig. 3.

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SHUTTLE MECHANISM FOR EMBROIDERING-MACHINES.

991,656. Specification of Letters Patent. Patented May 9, 1911.

Application filed February 16, 1910. Serial No. 544,194.

To all whom it may concern:

Be it known that I, MORRIS SCHOENFELD, a citizen of the United States, and a resident of the city of Rorschach, Canton of St. Gall, Switzerland, have invented certain new and useful Improvements in Shuttle Mechanism for Embroidering-Machines, of which the following is a specification.

My invention relates to a shuttle mechanism for embroidering machines wherein there are used a large number of sewing needles and a corresponding number of shuttles and the object is to provide a very simple and practical means whereby all, or a large group, of the shuttles may be renewed while the machine is in operation and without delaying the operation of the machine and in its entirety my invention also contemplates the use of a shuttle mechanism whereby two or more threads of different color may be simultaneously retained in such operative relation with the needles that the shuttle carrying either of said colors may be readily thrown into or out of engagement with the sewing threads, thus making it possible to produce stitching with a multi-color background and without having to rethread the shuttles for each thread. This is accomplished by employing two or more shuttles for each needle, either of which may be thrown into operative relation with the needles at the will of the operator.

By employing more than one shuttle for each needle and so constructing the mechanism that either set of shuttles may be used, the shuttles may be refilled without having to delay the operation of the machine for any material length of time.

By using one set of shuttles until they have been exhausted, and then shifting the mechanism to advance the other set into operative relation with the needles, the first shuttles may be refilled and replaced while the machine is in operation and while the second mentioned set are continuing the work. In this way the delay experienced in keeping the shuttles filled is avoided, and in machines where there are many hundred needles this is of importance. It is also important to provide an adjustment whereby a single operation will adjust a large number of the shuttles simultaneously.

It has been possible in prior machines to withdraw a single shuttle during the operation of the machine, but that has no bearing on the present invention, the purpose of which is to enable the total number of shuttles of the machine, say several hundred, or a large division thereof, upon the breaking of the threads or upon the same being used up, to be replaced by charged shuttles.

The objects above set forth are obtained preferably by making the shuttle track horizontal and placing thereon enough shuttles to provide say two shuttles for each needle and by making the shuttle driving rail adjustable, whereby the shuttles may be advanced in relation to the needles. During the operation of the machine all of the shuttles are being driven but only one to each needle is engaging the sewing thread while the other is traveling idle; and when the driving bar is advanced, or adjusted in its operation, the set of shuttles which was previously idle is brought into operative relation with the various needles while the ones which had been operating are moved so as to be out of operative relation with the needles. Whenever the threads of one set of shuttles have given out, the operator has only to adjust the shuttle drive bar, when all of the shuttles of the machine, or of a row, will be still reciprocated, but the shuttles which have become empty will be shifted in their relation to the needles and the other set will be advanced into operative relation to the needles, when the exhausted shuttles may be replaced without having to stop the machine during a long period as heretofore. The only stopping necessary is for adjusting the drive bar and the cutting of the threads. After this the machine may be started again and the exhausted shuttles replaced while the machine is in operation.

In the drawings forming a part of this application, Figure 1 is an elevation of a part of the shuttles of an embroidering machine and their operating elements, looking from that side nearest the fabric, Fig. 2 is a similar view showing the mechanism nearer the bottom of the machine and in which figure another form of my invention is shown, Fig. 3 is a similar view showing how the shuttle drive bars of a number of rows of shuttles may be simultaneously adjusted, Fig. 4 is an elevation showing in detail another modification of one part of my invention, Fig. 5 is a vie similarly showing another modification of a part of my invention, Fig. 6 is a view similarly showing another modification of a part of my invention, Fig. 7 is a view similarly showing another

modification of a part of my invention, and Fig. 8 is a cross section showing the relation of the needle bar and shuttle track.

My present invention is particularly adapted for use in a machine where the shuttle tracks are disposed horizontally and I will describe my invention as applied to such a machine, although I do not wish to be understood as limiting the scope of my invention thereby, as it is possible to adapt the invention to other forms without departing from the broad spirit of my invention. The invention may be applied to almost any form of embroidering machine where there are many simultaneously operating needles operating upon a fabric and I will only refer to so much of an embroidering machine as may be necessary to show an application of my invention.

In the machine herein illustrated the vertical walls or members *a*, of the frame are connected by horizontal beams *b*, *c*, so as to form a rigid frame structure. Arranged between the beams *b*, and *c*, at certain distances are upright standards *d*, of which the one nearest the front wall *a*, is shown. Rigidly secured to these standards are the shuttle rails or tracks *e*, which may be of any well known construction, with the exception of the disposition of the grooves as herein shown and which tracks preferably run the length of the machine; and as shown in the drawings, there may be as many of these tracks arranged in vertical rows as there are rows of needles. As shown in the present case these tracks are preferably provided with a groove *e*, to guide the shuttle drive bars *f*, and a groove e^2 to guide the shuttles themselves, whereby the shuttles may be arranged close to each other, end to end, while the drive bars are guided in separate grooves. To the end of the drive bars *f*, are secured a block or head *g*, to which a pitman or rod *h*, is pivotally attached.

In the form shown in Figs. 1 and 2 all the rods *h*, are fulcrumed to bellcrank levers *h'*, capable of rocking on pivots *i*, and operated by a common vertical rod *k*, which latter receives its force from any operating means which may be employed for operating the embroidering machine, such as the operating shaft *p*. A spring *m*, (Fig. 2) tends to draw the rod *k*, downward, so that the roller *n* on its lower end is constantly held in contact with the circumference of a cam *o*, which is fast on the main shaft *p*, and by which the rod *k* is reciprocated.

In the construction as so far described the operating bar *k*, is adapted to have a predetermined movement which remains constant and the adjustment of the shuttles for placing one or the other set into operative relation with the needles is accomplished by altering the connection either of the block *g* with the shuttle drive *f*, or by altering the connection of the block *g* with the connecting rod *h*. In the example shown in the upper rows of Fig. 1 the block *g* may be connected in either of two positions with the drive *f*, by placing the bolts *s*, either in the slots *g'* or g^2. If the bolts *s*, are in the slots g^2 then the relation of the shuttles to the needles will be such that the alternate shuttles *t*, of a row will be moved across the path of the needles and engage their threads, the other shuttles *t'* during this adjustment simply move idly and do not engage any threads. There are as many shuttles *t* and likewise *t'* as there are needles to be engaged. If now, the shuttles *t* should become exhausted of their threads then the bolts *s*, are taken out of the slots g^2, the bar *f* is moved forward and the bolts are reinserted in the slots *g'* when the new adjustment will cause an advance in the position of the drive bar *f* and instead of the shuttles *t* passing across the needles as heretofore, the shuttles *t'* will move across the needles and engage their threads; the shuttles *t* then moving idle. The shuttles *t* may now be refilled while the machine is operating with the shuttles *t'*, thereby avoiding the necessity of stopping the machine while the many shuttles are being refilled. It is understood that the drive bars *f* are provided with fingers *f'* which engage the shuttles and cause their reciprocation. If it is desired to have the reverse side of the fabric sewn with a plurality of colored threads, one set of shuttles *t* will be filled with one color thread and the other set with another color thread and upon changing the adjustment of the shuttle drive the one or the other colored thread may be used.

In the form shown in Fig. 2, the adjustment is made by means of a double connection between the rod *h*, and the block *g*. The rod *h* is provided with apertures *u'*, and the block *g* is provided with one aperture. A pin *u* passing through one of the apertures *u'* in the rod *h*, and through the aperture in the block *g* forms one engagement when one set of shuttles will be in operation, while the engagement of the pin *u* in the other of the apertures *u'* and in the aperture of the block *g* will form the other adjustment when the other set of shuttles will be in operation.

In Fig. 4 the adjustment is made by means of a lever action. In this form the block *g* is fixed to the end of the rod *h* and it has a slot *r* in which a pin *v'* on the lever *v*, moves, the lever *v*, being fulcrumed at *v''* to the drive bar *f*. With the lever in the position shown in Fig. 4, the shuttles *t'* will be in operation. When it is desired to throw the shuttles *t* into operation the lever *v* is moved over to the left position when the relative connection between the block *g* and the drive *f* will be changed.

In the form shown in Fig. 5 the adjustment is made by means of a longitudinal bolt. The threaded bolt e', passes through the block g, which is internally threaded and the ends of the bolt e' are clamped to the ears l' on the drive f by means of nuts. By loosening the nut on the bolt e' and turning the bolt the block g will be adjusted along the same thereby adjusting the connection between the block g and the drive f.

In the form shown in Fig. 6 the adjustment is made by a rack and pinion action. A pinion y, is secured to the block g by a bolt y' and the teeth of this pinion engage a rack on the drive f. By turning the pinion and clamping it by the bolt y' the relation between the block g and the drive f may be adjusted to throw either set of shuttles into operative relation with the needles.

In the form shown in Fig. 7 the rod k, is directly connected with a pinion z, which is suitably mounted to engage with a rack z^3 on the under side of the drive f. The pin Z' passing through the rod k may be engaged in either the slot z' or z'' whereby the pinion will be altered, thereby driving the drive f with either the first or second set of shuttles in operative relation with the needles.

In the form shown in Fig. 3 the connections between the drive f and the rods h remain constant but these rods h are connected with a link q which is itself adjusted in its connection with the rods r. The pin w passing through the aperture in the link q is engaged in either of the apertures in the rod r according to which set of shuttles is to be made operative. In this form the several rows of shuttles are simultaneously adjusted, or in other words the entire shuttle mechanism is simultaneously adjusted. This may be very advantageous in certain forms of machine.

It is obvious that the change from one set of shuttles to another is very simple and there is a saving of time in the operation of the machine, uniformity in the operation is secured and the shuttles require less attention.

While I have carefully described in detail several forms in which my invention may be practiced I do not wish to be limited in the scope of my claims. I consider the present invention an entirely new departure and I believe myself to be the first to arrange a double set of simultaneously operating shuttles for the various needles, one of which will be inoperative while the other is operating and the operation of which may be readily changed to throw either of said sets into operation. I have shown the adjustment as taking place between the connecting rod and the drive f, but it is understood that the adjustment may be made at various other places in the shuttle mechanism, so long as there is an adjustment between the ultimate source of power from which the shuttles are driven and the shuttles, and a double (or treble, etc.) set of shuttles are used.

The methods of adjustment shown in Figs. 1 and 2 will probably be preferable where there are only two rows of needles as in the common form of machine, while that shown in Fig. 3 may be preferable where there are many rows of needles, as in the showing. By making the shuttles track with the shuttles traveling in one groove and the shuttle drives in the other the shuttles may be placed close together, thereby rendering the mechanism practical and convenient.

Having described my invention what I claim is:

1. A machine of the class described having a plurality of sewing needles arranged in a row, a longitudinal shuttle track, a plurality of shuttles for each of the needles, adapted to travel in said shuttle track, a shuttle drive common to the several shuttles, operating means therefor and means for adjusting the connection of the operating means and shuttle drive, to cause either set of shuttles to be moved in operative relation with their needles and whereby the inoperative shuttles may be removed during the operation of the shuttle mechanism.

2. A machine of the class described having sewing needles arranged in a row, a longitudinal shuttle track and a plurality of shuttles for each of said needles arranged one behind the other in said shuttle track, a shuttle drive having fingers for engaging the several shuttles and adapted to operate the said shuttles simultaneously, operating means for the shuttle drive and means for adjusting the operative position of the shuttle drive, whereby either set of shuttles may be operated in operative relation with their respective needles, while the other set is inoperative, whereby the inoperative shuttles may be removed during the operation of the embroidering machine.

3. A machine of the class described having a plurality of rows of sewing needles and shuttle mechanism therefor, comprising shuttle guides, a plurality of sets of shuttles for the several needles, coöperating with the shuttle guides, shuttle drives for the shuttles of the several rows, means for operating the shuttle drives, common to a plurality thereof and means whereby the operation of the drives by the operating means may be separately adjusted to cause either set of shuttles of a given row to engage their needles.

4. A machine of the class described having a plurality of sewing needles and shuttle mechanism therefor, comprising shuttle tracks, a plurality of sets of shuttles for the several needles coöperating with the shuttle tracks, shuttle drives for the shuttles of the several rows, means for operating the shuttle drives, common to a plurality thereof,

and means whereby the operation of the several drives by the operating means may be simultaneously adjusted to cause either set of shuttles of the several rows to coöperate with their needles.

5. A machine of the class described having sewing needles and a shuttle mechanism, comprising a longitudinal shuttle track, a plurality of sets of shuttles for the several needles, guided by the shuttle track, a shuttle drive for the several shuttles, an upright shuttle operating element and means for adjustably connecting the upright operating element and the shuttle drive, whereby either of said sets of shuttles may be caused to cooperate with the said needles.

6. A machine of the class described having a plurality of rows of sewing needles, shuttle guides and a plurality of rows of shuttles, comprising a plurality of sets of shuttles for the several needles, drive bars for the several rows of shuttles, provided with links, operating means, and a link connected with the links of the several drive bars and adjustably connected with the operating means, whereby the several drive bars may be simultaneously adjusted to cause the coöperation of either of said sets of shuttles with the needles.

Signed at St. Gall, in the Canton of St. Gall, Switzerland, this 3rd day of February, 1910.

MORRIS SCHOENFELD.

In the presence of—

ALBERT PHILLIPS,

RANDALL ATKINSON.