H. SAURER.

JACQUARD EMBROIDERING MACHINE.

APPLICATION FILED MAR. 11, 1913.

1,139,375.

Patented May 11, 1915.

2 SHEETS—SHEET 1.

Fig. 1

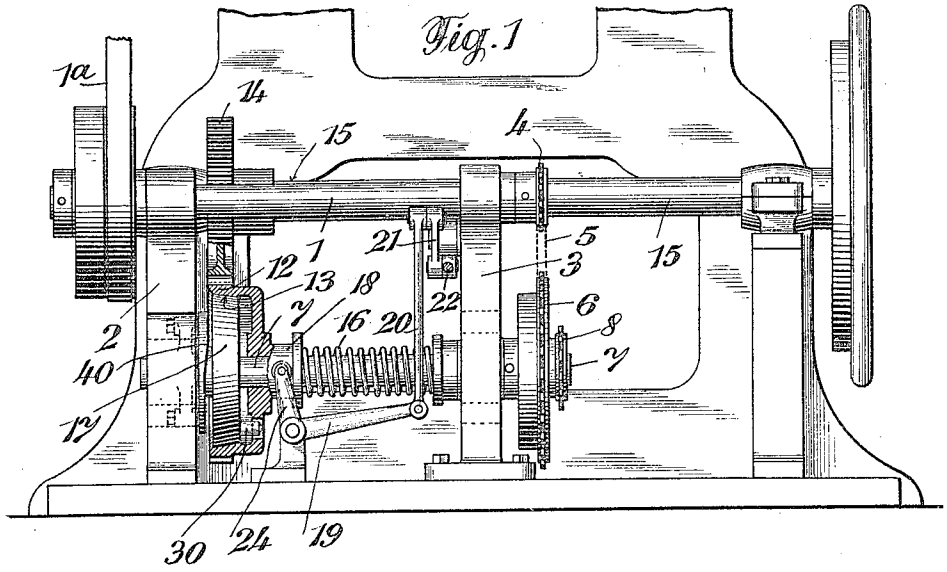


Fig. 2

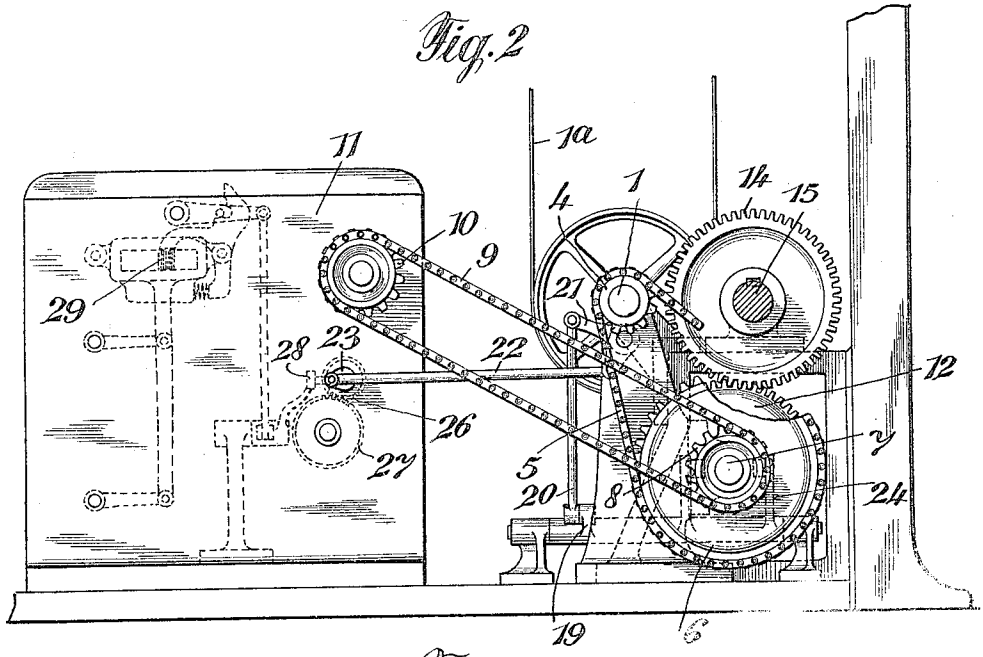
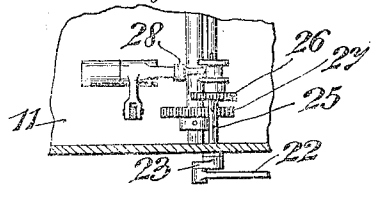


Fig. 3



Witnesses:

E. M. Taylor.

Worthington Campbell

Inventor:

Hyppolyt Saurer

BY Raddin, Gramby & Goodlett

Att'y's

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

H. SAURER.

JACQUARD EMBROIDERING MACHINE.

APPLICATION FILED MAR. 11, 1913.

1,139,375.

Patented May 11, 1915.

2 SHEETS—SHEET 2.

Fig. 4

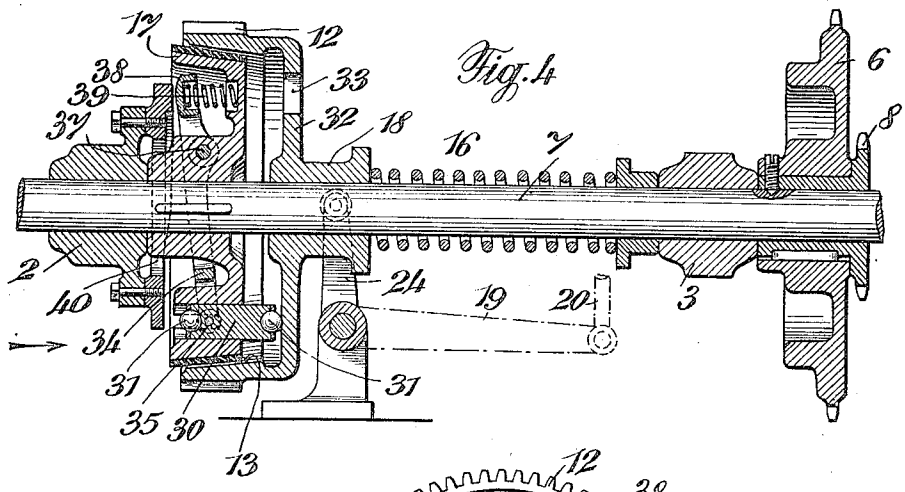


Fig. 8

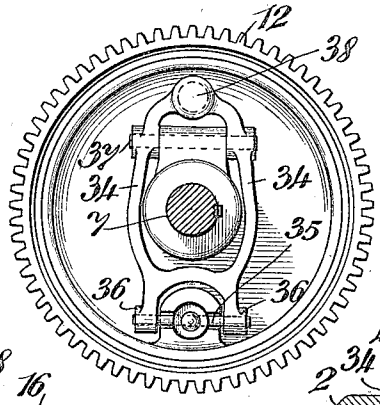


Fig. 5

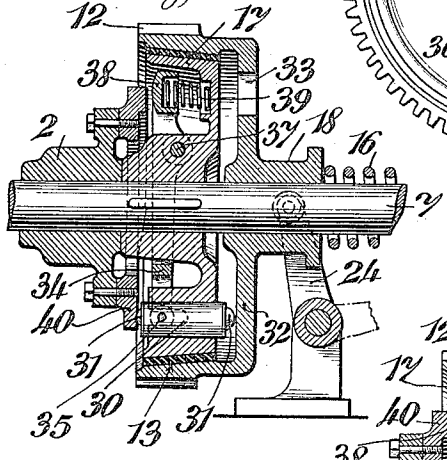


Fig. 6

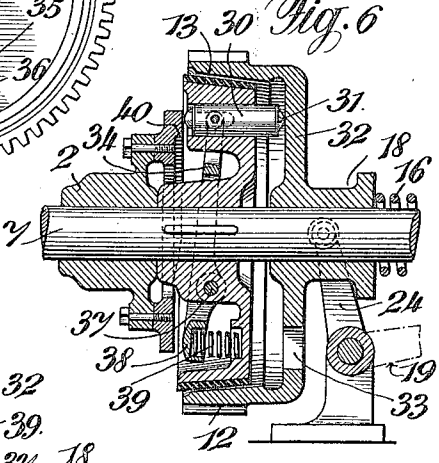
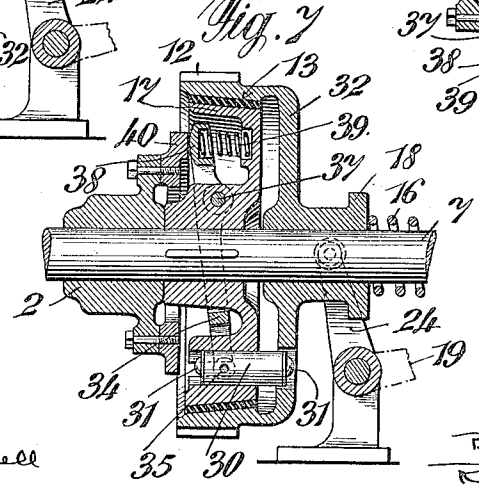


Fig. 7



Witnesses:

E. M. Taylor.

Worthington Campbell

Inventor:

Hjalmar Saurer

By

Redding Greely & Goodlett

Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HIPPOLYT SAURER, OF ARBON, SWITZERLAND.

JACQUARD EMBROIDERING-MACHINE.

1,139,375. Specification of Letters Patent. Patented May 11, 1915.

Application filed March 11, 1913. Serial No. 753,541.

To all whom it may concern:

Be it known that I, HIPPOLYT SAURER, a citizen of the Republic of Switzerland, residing at Arbon, Switzerland, have invented new and useful Improvements in Jacquard Embroidering-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The present invention relates to jacquard embroidering machines, and refers more specifically to coupling mechanism interposed between the embroidering apparatus proper and the jacquard apparatus or automat.

In embroidering machines with jacquard attachment the embroidering apparatus proper periodically remains idle, while the jacquard apparatus continues its operation. It is essential that these two apparatus be coupled without shock at definite periods, so that they can then continue their respective and interdependent operations in absolute synchronism; that is to say, on coupling, the shaft of the embroidering apparatus must be in the proper angular position with respect to that of the automat.

According to the present invention the coupling of the idle embroidering apparatus with the operating automat is brought about by operatively combining a friction clutch with a positive coupling in such manner that at first the embroidering apparatus is coupled temporarily with the automat, is then uncoupled again until the proper angular position between the two shafts to be coupled is attained, and is only then positively coupled. In place of the pin coupling there may also be a claw coupling, a tooth coupling, or any other positive or rigid coupling device.

In order to make this invention more readily understood, it will now be described in detail with reference to the accompanying drawings, in which—

Figure 1 shows the new coupling device in front view, partly in section, with associated portions of the driving mechanism. Fig. 2 is a view in side elevation of the parts shown in Fig. 1, and the automat. Fig. 3 shows a plan view of a detail of the automat. Figs. 4, 5, 6 and 7 show sectional elevations of the coupling device in various operative positions. Fig. 8 shows a side elevation looking in the direction of the arrow in Fig. 4.

The auxiliary shaft 1 is continuously driven from the main driving shaft (not shown) by the belt 1^a. This shaft is journaled in bearings 2, 3. To its inner end is fixed a sprocket 4 which is connected by a chain 5 to a larger sprocket 6, fixed on a shaft 7, which latter thus is also continuously rotated. A sprocket 8 is fixed to the sprocket 6, and a chain 9 transmits the rotary motion of sprocket 8 to the sprocket 10 of the automat 11. Obviously this latter is in constant operation as long as the main driving shaft revolves.

On the shaft 7 is loosely mounted a toothed wheel 12, adapted to serve as a female clutch member having an internal conical face 13. This wheel meshes with a toothed wheel 14, fixed on the shaft 15, through which latter the embroidering apparatus proper is actuated. On this shaft 15 are secured the different well-known eccentrics and cams (not shown) which cause the various operative movements of the embroidering apparatus, such as reciprocation of the needles, and the like. The female clutch member 12 is ordinarily pressed into engagement with the male clutch member or cone 17 by a helical spring 16. This cone 17 is fixed on the shaft 7. The neck 18 of the toothed wheel 12 is engaged by the forked arm 24 of an elbow lever, whose other arm 19 is connected by a rod 20 to an elbow lever 21, which latter in turn is connected by a rod 22 to a crank 23. The latter is fixed on the shaft 25 of the automat, which shaft can be periodically rotated by the toothed wheel 26 being slid into mesh with the continuously rotating toothed wheel 27. The wheel 26 is alternatively slid into or out of mesh with the wheel 27 by a lever 28 which is reciprocated under the control of the needles 29 from the pattern card.

Carried by the cone 17 is a pin 30, which can be displaced in a direction parallel to the shaft 7 and carries an anti-friction ball 31 at either end. The toothed wheel 12 has a disk-like flange as at 32 with a perforation 33, adapted to receive the inner or right hand end of pin 30. The latter is engaged by a double-armed lever 34, having laterally extending lugs 35, which take into the eyes

36 of the lever 34 (Fig. 8). It is pivoted at 37 on the cone 17 and carries at its free end a cap 38, which receives one end of a compression spring 39, whose other end rests against the flange of the cone 17. This spring has a tendency to force the pin 30 toward the plate or flange 32. The bearing 2 is provided with an annular cam 40 (Fig. 1).

The coupling operates in the following manner: If the shaft 15 is not coupled with the shaft 7, and the clutch members 17 and 12 are not in engagement and have the relative positions shown in Fig. 4, then the clutch member 12, obviously, will remain idle. If now the lever 28 (Figs. 2 and 3) is oscillated, the elbow lever 19, 24 will be likewise rocked, with the result that the clutch member 12 is displaced toward the left, from the position of Fig. 4 into that shown in Fig. 5, and the friction clutch 12, 17 is closed, so that now the part 12 rotates, and through it the toothed wheel 14 and the shaft 15 of the embroidering apparatus. By this displacement of part 12 the pin 30 (Fig. 5) is likewise displaced toward the left, so that its outer or left hand ball 31 contacts with the cam surface 40 and its inner ball 31 with the plate or flange 32. On the synchronous rotation of the parts 12 and 17 the right ball remains at a certain point of the plate 32. The left ball now rides on the cam surface 40 and thereby forces the plate 32 toward the right, as shown in Fig. 6, which causes disengagement of the two clutch members and the uncoupling of the two shafts 15 and 7. By reason of the inertia of the rotating masses the shaft 15 will continue its rotation for a short period of time, but more slowly than the driven cone 17, until the pin 30 comes in line with the perforation 33. At this moment the spring 16 forces the clutch member 13 toward the left into the position shown in Fig. 7, the pin 30 entering the perforation 33 under the influence of the spring 39. The parts are now positively coupled, and the arrangement is such that the pin enters the perforation 33 at the precise moment when the two shafts 15 and 7 are in the desired angular position relative to one another. Precisely what this means, will now be explained. Obviously the automat must not shift the embroidery frame while the needles of the embroidering apparatus are still in the fabric stretched over the frame, otherwise the automat would be damaged. Consequently care must be taken that the automat is coupled with the embroidering apparatus only when the latter is in a definite position relative to the former, that is to say, when for instance the driving shaft 15 of the embroidering apparatus assumes a definite angular position with respect to the shaft 7 of the automat.

The object of this invention, then, is to provide means, whereby the respective parts are without shock coupled at definite periods, so that they then operate in perfect time. With a friction clutch alone, or with a positive clutch alone, such a result cannot be attained. If, for instance, after the automat has been uncoupled from the embroidering apparatus for boring purposes, so that only the automat keeps on running while the embroidering part stands still, the embroidering apparatus is to be coupled on again, it is absolutely necessary, as above explained, that the two apparatus be coupled only at the moment when they are in a definite position relative to each other. It is obvious that this could never be attained with a friction clutch alone, inasmuch as the two members of a friction clutch can be coupled in any angular position. Thus only a positive coupling mechanism can serve the purposes. On the other hand, a positive coupling device alone, such as a pin coupling, a claw coupling, or the like always couples abruptly with a shock which it is the object of the invention to prevent. According to this invention the coupling operation is divided into two steps, whereby at first a frictional coupling without shock is obtained, but out of time, and then the positive timed coupling takes place.

In the example shown is embodied the combination of a positive coupling device with a friction clutch, and their coöperation is such that on the embroidering apparatus being coupled to the automat, first the friction coupling is let in momentarily for starting without shock the masses of the embroidering apparatus; it is then quickly uncoupled for a short period, the masses of the embroidering apparatus remaining in motion the while; and lastly the pin coupling is thrown in and thereby the two moving apparatus coupled positively and in a predetermined relative position. Inasmuch as the embroidering apparatus was started without shock by the friction clutch and the final coupling is effected by means of the pin coupling (though this latter does not operate without shock by itself) while both devices to be coupled are in motion in the same direction, shocks are absolutely prevented. The intermediate uncoupling of the friction clutch after the first coupling serves solely the purpose of then throwing in the pin coupling, which latter in the example shown, also causes simultaneous letting-in of the friction clutch.

I claim as my invention:—

1. In a jacquard embroidering machine, in combination, a shaft for driving the embroidering apparatus, a toothed wheel thereon, a shaft for driving the automat, a toothed friction clutch member loose on the second shaft and coöperating with the

toothed wheel on the first shaft, a second friction clutch member fast on the shaft which drives the automat, a pin slidably mounted in said second clutch member, said first clutch member having a perforation adapted to receive said slidable pin, and means, controlled from the jacquard apparatus, for forcing said friction clutch members into operative engagement.

2. In a jacquard embroidering machine, in combination, a shaft for driving the embroidering apparatus, a toothed wheel fast thereon, a shaft for driving the automat, a toothed friction clutch member loosely mounted on the second shaft and meshing with the toothed wheel fast on the first shaft, a second friction clutch member fixed on the second shaft, a pin slidably arranged in said second clutch member, said first mentioned clutch member having a perforation adapted to receive said sliding pin, a cam surface adapted to cause sliding displacement of said pin, and means, controlled from the jacquard apparatus, for forcing said friction clutch members into operative engagement and closing the pin coupling.

3. In a jacquard embroidering machine, in combination, driving means for the embroidering apparatus, driving means for the jacquard apparatus, a friction clutch for operatively connecting the said two driving means, means for automatically opening said clutch, and means for thereafter automatically closing a positive coupling intermediate the said driving means for the embroidering apparatus and the said driving means for the jacquard apparatus.

4. In a jacquard embroidering machine, in combination, means for driving the embroidering apparatus, means for driving the jacquard apparatus, frictional means for coupling the embroidering apparatus and the jacquard apparatus, and means for thereafter opening said frictional means and then coupling positively the embroidering apparatus and the jacquard apparatus.

5. In a jacquard embroidering machine, in combination, means for driving the embroidering apparatus, means for driving the jacquard apparatus, coupling means intermediate the embroidering apparatus and the jacquard apparatus and comprising a friction coupling and a positive coupling, and means for first closing the friction coupling, and then opening the friction coupling and finally closing the positive coupling.

6. In a jacquard embroidering machine, in combination, means for driving the embroidering apparatus, means for driving the jacquard apparatus, a frictional clutch intermediate of said driving means, a device for coupling positively the two members of the friction clutch and a stationary cam for actuating said positive coupling device.

7. In a jacquard embroidering machine, in combination, means for driving the embroidering apparatus, means for driving the jacquard apparatus, a frictional clutch intermediate of said driving means, a sliding spring-pressed pin carried by one of the members of the frictional clutch and adapted to engage the other and a stationary cam for moving said pin.

8. In a jacquard embroidering machine, in combination, a shaft for operating the embroidering apparatus, a shaft for operating the jacquard apparatus, a friction clutch interposed between said shafts, means for closing said clutch, and means for thereafter opening said clutch and then effecting a positive coupling of the members of the frictional clutch.

9. In a jacquard embroidering machine, in combination, a shaft for operating the embroidering apparatus, a shaft for operating the jacquard apparatus, a friction clutch interposed between said shafts, a sliding pin carried by one of the members of the friction clutch and adapted to bear against and to engage the other member, and a cam to move said pin to first open the friction clutch and thereafter to couple the members thereof positively.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnsses.

HIPPOLYT SAURER.

Witnesses:
E. M. TAYLOR,
WORTHINGTON CAMPBELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."