

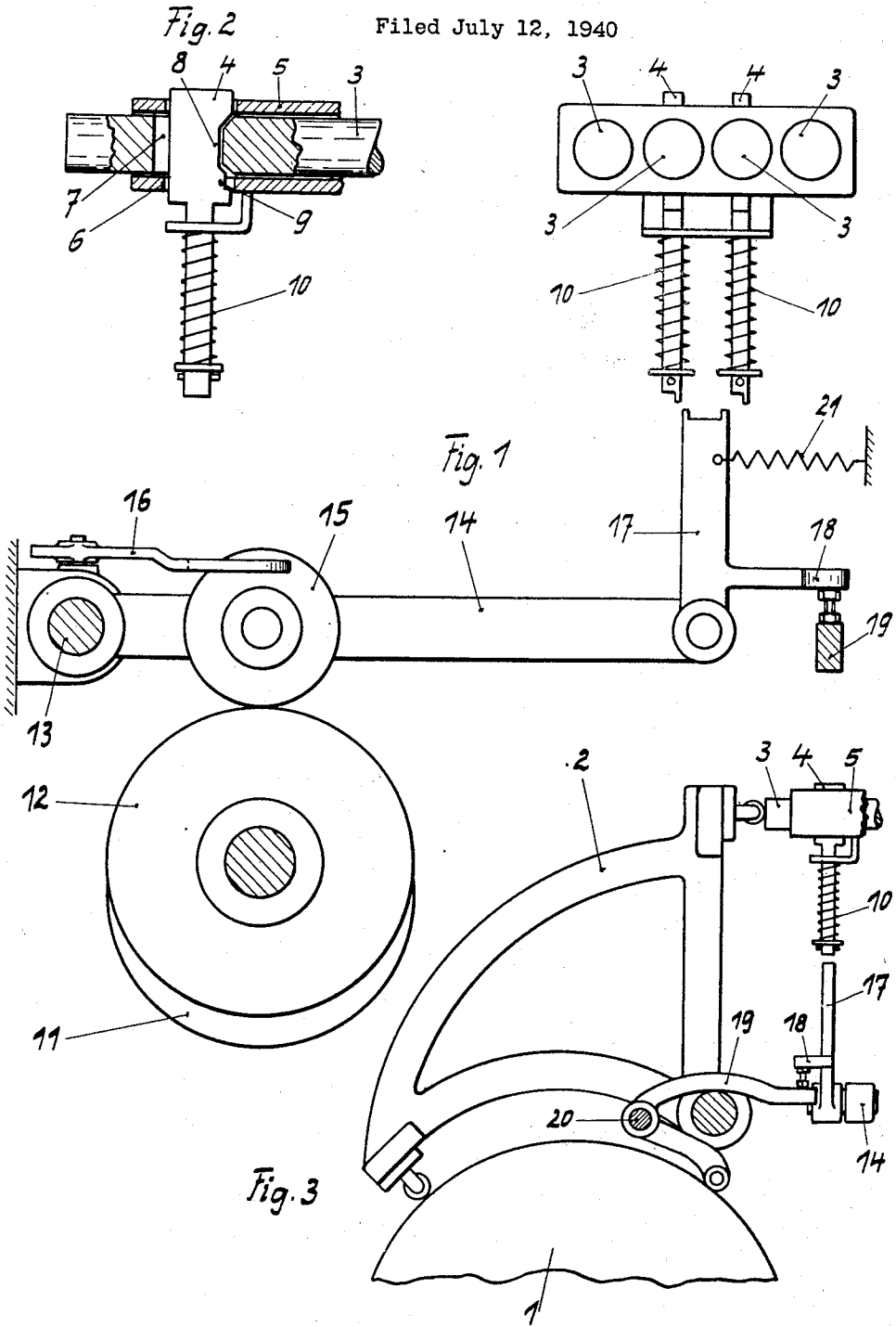
Dec. 9, 1941.

P. SCHÖNFELD ET AL

2,265,400

WARP MACHINE

Filed July 12, 1940



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UNITED STATES PATENT OFFICE

2,265,400

WARP MACHINE

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Application July 12, 1940, Serial No. 345,067
In Germany June 18, 1938

5 Claims. (Cl. 66—86)

This invention relates to an automatic apparatus for warp machines, particularly high-speed warp machines.

It is known to equip warp machines with an automatic apparatus having stepped keys or suitable equivalents for the longitudinal adjustment of the lapping machines or bars, and cams making one turn at the production of each course for controlling the keys.

These known devices represent rather complex Jacquard apparatus provided, for each lapping machine, with a stepped key controlled by a pattern chain and a keylike adjusting member in the form of an oscillatory segment which by means of a cam is brought into the desired position, the arrangement being such that the stepped key brings about all longitudinal displacements under the frame needles and the cam-controlled segment all longitudinal displacements above these needles.

Compared with the known art, the novel feature of the automatic apparatus according to the invention consists in forming the cams so that they adjust their stepped keys for all longitudinal motions of the lapping machines, which are required in a course.

The invention provides therefore automatic apparatus possessing the simplest possible control means for the keys or equivalents. As each stepped key, as long as it carries out uniform adjusting motions, needs only a single cam for complete longitudinal adjustment of the lapping machines, new possibilities present themselves in the construction of warp machines. A machine for producing plain fabrics may be designed, for instance, whose automatic apparatus requires only one stepped key for each lapping machine and one cam for each key, so that maximum reliability in operation ensues, since no other movable parts are necessary. Such a machine can be driven at exceptional speed, because it runs practically without vibration. As all longitudinal adjustments of the lapping machines are effected by a single control member having the form of a cam, the entire circumference of the latter is available for adjusting the stepped key whereby a working path is provided long enough to insure soft transition.

The invention may further be advantageously applied to warp machines of known type fitted with automatic apparatus comprising an ordinary pattern mechanism, as chains or wheels, between which and the lapping machines stepped keys are interposed. Owing to the keys and their controls, the automatic apparatus in such machines

have hitherto been complex, unsteady in operation and therefore so slow that they could not be used in high speed warp machines. This will become possible now by the introduction of cams for the keys, as suggested by the invention.

Furthermore, machines equipped with automatic apparatus of the kind referred to in the preceding paragraph can be used for a new purpose if provided with key adjusting means according to the invention. These machines have so far been employed only in the manufacture of fabrics, in which after a large number of courses a change in lapping continuously occurs or for instance a special warp is worked in at large distances so as to form loops, but they may serve now also for making plain goods, in which case the stepped keys only are working. Although plain fabric can be produced also on the known warp machines having an automatic apparatus with pattern mechanism and provided with stepped keys interposed between the pattern mechanism and the lapping machine, such manufacture is too uneconomical to be attractive. Machines fitted with automatic apparatus of this class have a lower speed than machines provided with plain apparatus, and the production of plain fabric, as plain half tricot, does not pay. When, however, cams of a type as proposed by the invention permit rapid adjustment of the stepped keys, etc., the machines can be operated at a much higher speed during the making of plain goods than is possible if the pattern mechanism has to cooperate. It is hardly necessary to point out that an automatic apparatus with pattern mechanism and stepped keys interposed between it and the lapping machines will also be considerably speeded up by the application of the invention, though the key adjusting means are practically unchecked as to speed.

One embodiment of the invention is illustrated in the accompanying drawing, in which

Figure 1 is a side view of the actuating means for the stepped keys acting upon the slides of the lapping machines;

Fig. 2 shows part of a slide with an associated stepped key, partly broken up; and

Fig. 3 is a front view of the two slide adjusting members.

The lapping machines in a warp machine, particularly high speed warp machine, according to the invention are longitudinally adjusted by stepped keys 4 controlled by cams 11 which make one turn during the working of a course and which are so shaped that they adjust a stepped

key 4 for all longitudinal motions of the lapping machine required for one course.

The automatic apparatus for the adjustment of the lapping machines may have only one stepped key 4 for each lapping machine and one cam 11 for adjusting the key 4. In the construction shown a key 4 is interposed in known manner between the pattern mechanism 1, 2 and the lapping machine, as indicated in Fig. 3. The pattern mechanism comprises a drum 1 provided with an open-link chain, not shown, or the mechanism may consist of pattern wheels and transmission levers 2 acting upon a slide 3. The keys 4 will then be independent of the pattern mechanism 1, 2 between which and the slide 3 they are disposed, and for that purpose are guided vertically and arranged in a slide box 5. With their rear edge the stepped keys 4 abut against an edge 6 of the box 5. The slides 3 have a recess 7 which permits adjustment of the slides by the pattern member 1 independently of the stepped keys 4. Likewise, the slides 3 can be adjusted by the stepped keys 4 independently of the pattern mechanism 1, 2. In the first case, the arrangement is such that the stepped keys 4 place their lowest step, i. e., the step 8, opposite the slide 3 which, due to the recess 7, can thus be inwardly displaced by the pattern mechanism 1, 2. In the other case, the stepped keys 4 are lifted to place their working step opposite the slides 3. When in lowest position the keys 4 are held therein by a spring 10.

If the stepped keys 4 possess only one working step 9 besides their starting step 8 as shown, they can be used only for simple lapping over 1 under 1. Should different lapping operations be desired, the keys 4 must be altered accordingly, but the arrangement is invariably such that between the various steps an inclined surface is provided, so that the keys during upward adjustment displace their slide 3 inwardly. The keys 4 are adjusted by means of a cam 11 on the shaft of which a rotating disc 12 is preferably arranged. It is possible also to provide several cams for each stepped key 4 to permit a change in lapping by letting one or the other cam act upon each key. To facilitate this operation, the member directly moved by the cams, i. e., a lever 14 disposed at 13, is fitted with a roller 15 which is displaceable on its shaft and is controlled through the medium of a forked lever 16 by a pattern mechanism, not shown. The roller lever 14, 15 does not act directly upon its stepped key 4 but with the aid of a ram 17 which functions in a highly advantageous manner. If, for in-

stance, as assumed in the drawing, the automatic apparatus has four slides 3 of which the central ones possess two stepped keys 4, the arrangement may be such that, when the stepped keys 4 have to work only alternately, one cam 11 may actuate one roller lever 14, 15 and one ram 17 both keys 4. For this purpose, the ram 17 is articulated to the free end of the roller lever 14, 15 and provided with an arm 18 acted upon by an adjusting lever 19 which, as shown in Fig. 3, is arranged at 20 and preferably controlled by the pattern member 1 equipped with a special wheel or an open-link chain, not shown. In this way, the ram 17 may be used for more than two keys 4. The ram 17 is secured against accidental displacement by a spring 21 which always draws the arm 18 against the adjusting lever 19.

The stepped keys 4 may be replaced by other means producing the same effect, as stepped segments, etc.

What is claimed is:

1. In a warp machine, particularly a high speed warp machine, an automatic apparatus comprising stepped keys for longitudinally adjusting the lapping machines, cams for controlling said keys, said cams being so formed that they adjust their respective keys for all longitudinal motions of the lapping machines required in one course, and a rotatable disc connected with each of said cams.

2. In a warp machine, particularly a high speed warp machine, an automatic apparatus according to claim 1, comprising a ram acting directly on the keys for adjusting them in ascending direction.

3. In a warp machine, particularly a high speed warp machine, an automatic apparatus according to claim 1, comprising an adjustable ram for alternately actuating two or more keys.

4. In a warp machine, particularly a high speed warp machine, an automatic apparatus according to claim 1, comprising an adjustable ram for alternately actuating two or more keys, said ram being movably disposed with its lower end on the member moved by the cams.

5. In a warp machine, particularly a high speed warp machine, an automatic apparatus according to claim 1, comprising an adjustable ram for alternately actuating two or more keys, said ram being movably disposed with its lower end on the member moved by the cams and controlled by a pattern mechanism.

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