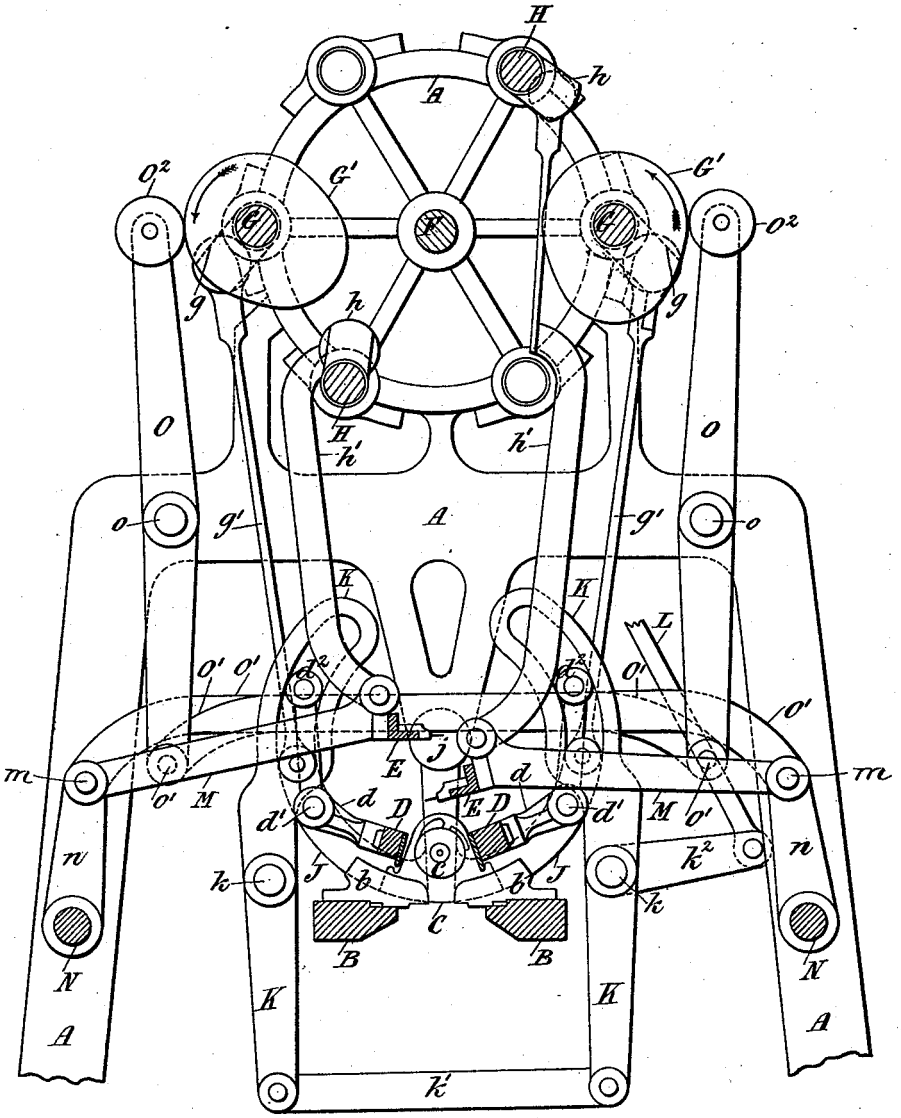
(No Model.) 3 Sheets—Sheet 1.

E. COPE.

TWIST LACE MACHINE.

No. 539,936. Patented May 28, 1895.

Fig. 1.



Witnesses.
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C. W. Brooke.

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(No Model.) 3 Sheets—Sheet 2.

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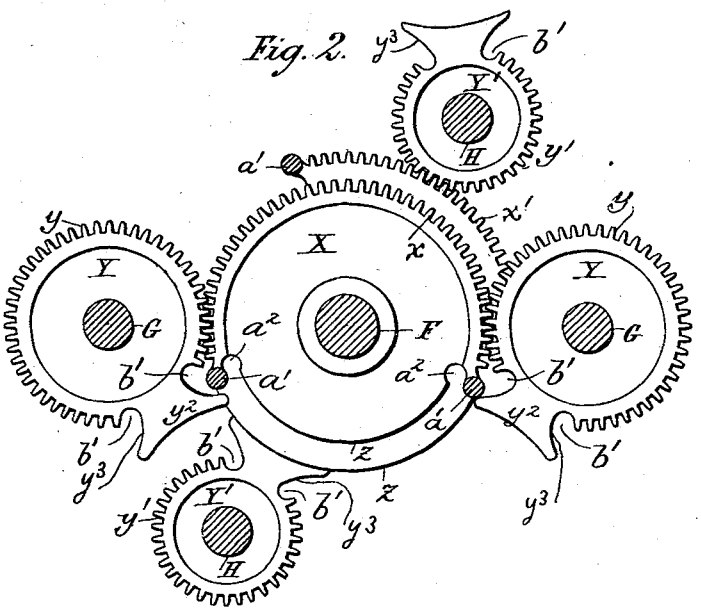
TWIST LACE MACHINE.

No. 539,936. Patented May 28, 1895.

Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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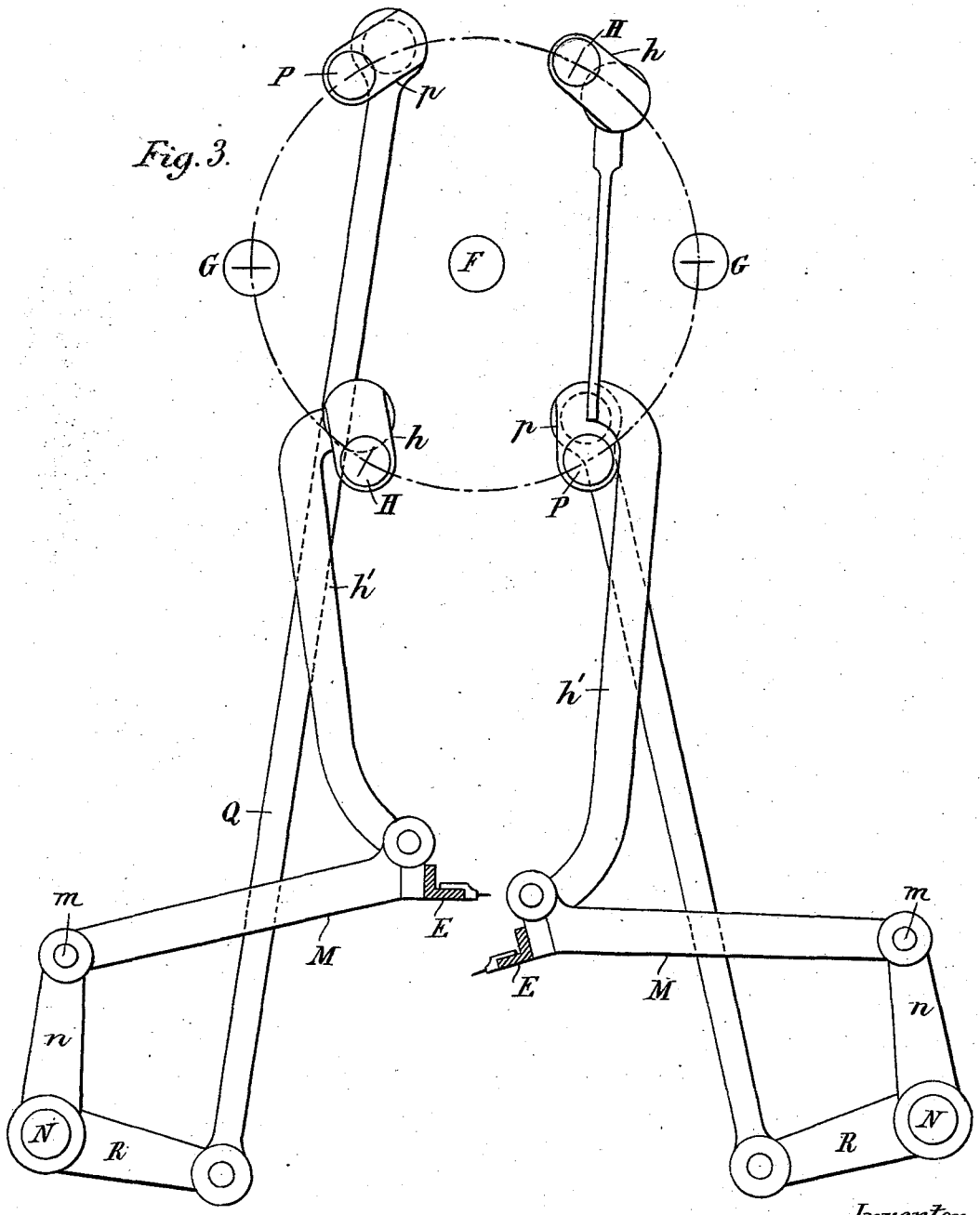
TWIST LACE MACHINE.

No. 539,936. Patented May 28, 1895.

Fig. 3.



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UNITED STATES PATENT OFFICE.

EDWARD COPE, OF NOTTINGHAM, ENGLAND.

TWIST-LACE MACHINE.

SPECIFICATION forming part of Letters Patent No. 539,936, dated May 28, 1895.

Application filed May 11, 1894. Serial No. 510,901. (No model.) Patented in England April 27, 1893, No. 8,514, and May 13, 1893, No. 9,642, and in France May 5, 1894, No. 238,298.

To all whom it may concern:

Be it known that I, EDWARD COPE, lace manufacturer, a subject of the Queen of Great Britain, residing at New Basford, Nottingham, England, have invented certain new and useful Improvements in Twist-Lace Machines, (for which I have received Letters Patent in Great Britain, No. 8,514, dated April 27, 1893, and No. 9,642, dated May 13, 1893, and in France, No. 238,298, dated May 5, 1894,) of which the following is a specification.

According to this invention the necessary intermittent movements of the various parts of this machine are obtained directly from a number of shafts arranged in a circle around a single central shaft from which they are driven by intermittent gearing. Thus the catch bars operating the carriages are driven by links from cranks on a pair of opposite shafts. The up and down motion of given to the point bars by links from cranks on another pair of opposite shafts. The to and fro motion of the point bars is effected by levers operated by cams, or this to and fro motion may be given by links from cranks on a third pair of shafts. The same intermittently driven shaft is in some cases used for giving a motion to two different parts. This invention is applicable to levers or to "go through" machines. To give motion to the catch bars when working on the levers or "go through" principle I employ concentric circular segments suitably mounted to carry trucks or slides to cause the catch bars and blades to take in or release the carriages as desired. The necessary motion for taking and releasing is given by a cam or otherwise.

Figure 1 is a vertical section of a machine constructed according to my invention, many of the ordinary parts being omitted. Fig. 2 is a vertical section of the upper part only of the machine, all parts except the gearing being omitted. Fig. 3 shows a modification.

A is the frame of the machine.

B are the comb bars fixed to the frame and *b* are the combs.

C is one of the carriages and *c* its bobbin.

D are the catch bars and E the point bars.

F is a central shaft and G G H H are four shafts ranged in a circle round it and driven from it (as shown in Fig. 2) by intermittent gearing such as is described in the specification of my British Patent No. 8,514, of the year 1893.

A wheel X, is fixed to the shaft F, and it has a partial ring of teeth x, gearing with partial rings of teeth y, on the pinions Y, which are secured to the shafts G. It is also provided with a partial ring of teeth x', of greater radius gearing with the teeth y' on the pinions Y', secured to the shafts H. The plain convex portions z and z' of the wheel X, are of less radius than the corresponding toothed portions x and x'. The concave surface of each of the pinions Y and Y' forms the base of a projection y^2, of approximately triangular form, whose other two sides are curved at y^3. At the junction of each of these two sides with the pinion at the ends of the partial ring of teeth there is a circular recess b'. At each end of each partial ring of teeth x x', on the wheel X, there is a cylindrical pin a' preferably made renewable as it is subjected to a considerable amount of wear, and beyond these pins there are recesses a^2 to receive the ends of the base of a triangular projection when the pin is coming into or going out of gear.

As the wheel X, rotates, the pinion Y, for instance, is driven as long as the toothed portions are in gear. Just as the teeth go out of gear one of the cylindrical pins a' enters one of the semi-circular recesses b' in the pinion, and acting as a tooth continues to drive the pinion until the leading edge of the plain, convex portion z of the wheel comes against the convave surface of the projection y^2 and continues the rotation at a greatly diminishing speed until it brings the concave surface concentric with the wheel and thus locks the pinion. The continued rotation of the wheel in time brings the other cylindrical pin a' against one of the curved sides of the projection y^2, and riding up it turns the pinion, the speed gradually increasing until the pin reaches the semi-circular recess b' in the pinion, and the teeth come into gear, when the pinion is driven at full speed.

g g h h are cranks on the shafts G and H. The cranks g are connected by rods g' to the ends of two bent levers J whose other ends are pivoted at j to the frame of the machine.

The catch bars D are mounted on the ends of bell crank levers d pivoted at d' to the bent levers J. The other ends of the bell crank levers d carry trucks or slides d working in circular slots in the levers K fixed on shafts k working in bearings on the frame of the machine, or the ends of the bell crank levers d may be pivoted to slides working in circular guides on the levers K. The levers K are connected by a link k' and one of their shafts k has an arm k^2 fixed to it, rocked by the rod L operated by a cam (not shown in the drawings) on the central shaft F. It will thus be seen that as the bent levers J rock the necessary to and fro motion is given to the catch bars D while they are caused to engage and disengage with the carriages C by the action of the levers K on the tail ends of the bell crank levers on which they are mounted.

The point bars E are fixed to the ends of rods M whose other ends are pivoted at m to arms n fixed to the rocking shafts N working in bearings on the frame of the machine. The up and down motion is given to the point bars from the cranks h h by the connecting rods h' h' and to and fro motion is given by the levers O. These levers have their fulcrums at o, and the lower end of each lever is pivoted at o', to the end of a link O', the opposite end of which is pivoted at m, to the adjacent arm n, and also at this point it is pivotally connected to the corresponding rod M. The opposite ends of the levers O, carry trucks O^2, working against cams G', on the shafts G.

The cams G' and levers O may be dispensed with and the to and fro motion be obtained from a pair of shafts driven by intermittent gearing from the central shaft F. This arrangement is shown in diagram at Fig. 3 where P P are the two shafts, p p cranks upon them, Q Q connecting rods and R R arms fixed to the rocking shafts N.

What I claim is—

1. In a twist lace machine, the combination of the point bars, the catch bars, a central driving shaft, two or more shafts parallel with and arranged around the driving shaft, the wheel X, on the driving shaft, having partial rings of teeth, the pinions Y, Y', having partial rings of teeth gearing with the wheel X, fixed on the shafts parallel with the driving shaft, means for stopping the rotation of the pinions when the teeth are out of gear and for again bringing the teeth into gear, and means for communicating motion from the pinions to the point bars and catch bars.

2. In a twist lace machine, the combination of the point bars, the catch bars, a central driving shaft, two or more shafts parallel to and arranged around the driving shaft, the wheel X, on the driving shaft having partial rings of teeth, the pinions Y, Y', having partial rings of teeth gearing with the wheel X, the projections on the pinions having inclined surfaces and recesses, as described, the pins a', on the wheel X, and means for communicating motion from the pinions to the point bars and catch bars.

3. In a twist lace machine, the combination of the catch bars, a central driving shaft, the shafts G, parallel with the driving shaft, a wheel X, on the driving shaft having a partial ring of teeth x, pinions Y, having partial rings of teeth y, gearing with the teeth x on the wheel X, and free to rotate an indefinite number of revolutions in the same direction the triangular projections on the pinions having curved surfaces and recesses as described, pins a', on the wheel X, engaging the triangular projections and riding along them to gradually start and gradually stop the pinions and means for communicating motion from the pinions Y to the catch bars.

4. In a twist lace machine, the combination of the point bars, a central driving shaft, the shafts H, parallel with the driving shaft, a wheel X on the driving shaft having a partial ring of teeth x', pinions Y', on the shafts H, having partial rings of teeth y', gearing with the teeth x' on the wheel X, triangular projections on the pinions having curved surfaces and recesses, as described, pins a', on the wheel X, engaging the projections and riding along them to gradually start and gradually stop the pinions, and means for communicating motion from the pinions to the point bars.

5. In a twist lace machine, the combination of the combs, the catch bars, the curved rocking levers, the bell-crank levers fixed at one end to the catch bars, and bent levers to which the bell-crank levers are also pivoted and which oscillate about the center of the curve of the combs.

6. In a twist lace machine, the combination of the shafts F, and G, intermittent gearing whereby the latter are driven from the former, the catch bars D, the bell-crank levers d to which the catch bars are secured, the bent levers J to which the bell-crank levers are pivoted, the rods g' connected with the levers J and operated from the shafts G, the rocking levers K, trucks or slides on the bell-crank levers d, operating in slots in the levers K, and means for operating the levers K.

7. In a twist lace machine, the combination of the point bars E, rods M carrying them, rock shafts N, arms n, fixed to them, and pivoted to the rods M, the central driving shaft F, the shafts H parallel to it, intermittent gearing whereby the latter are driven from the former, the rods h' connected to the inner ends of the rods M and driven from the shafts H, whereby the point bars are raised and lowered, and means operated by intermittent gearing driven from the shaft F, for giving a to and fro motion to the point bars.

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Witnesses:
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