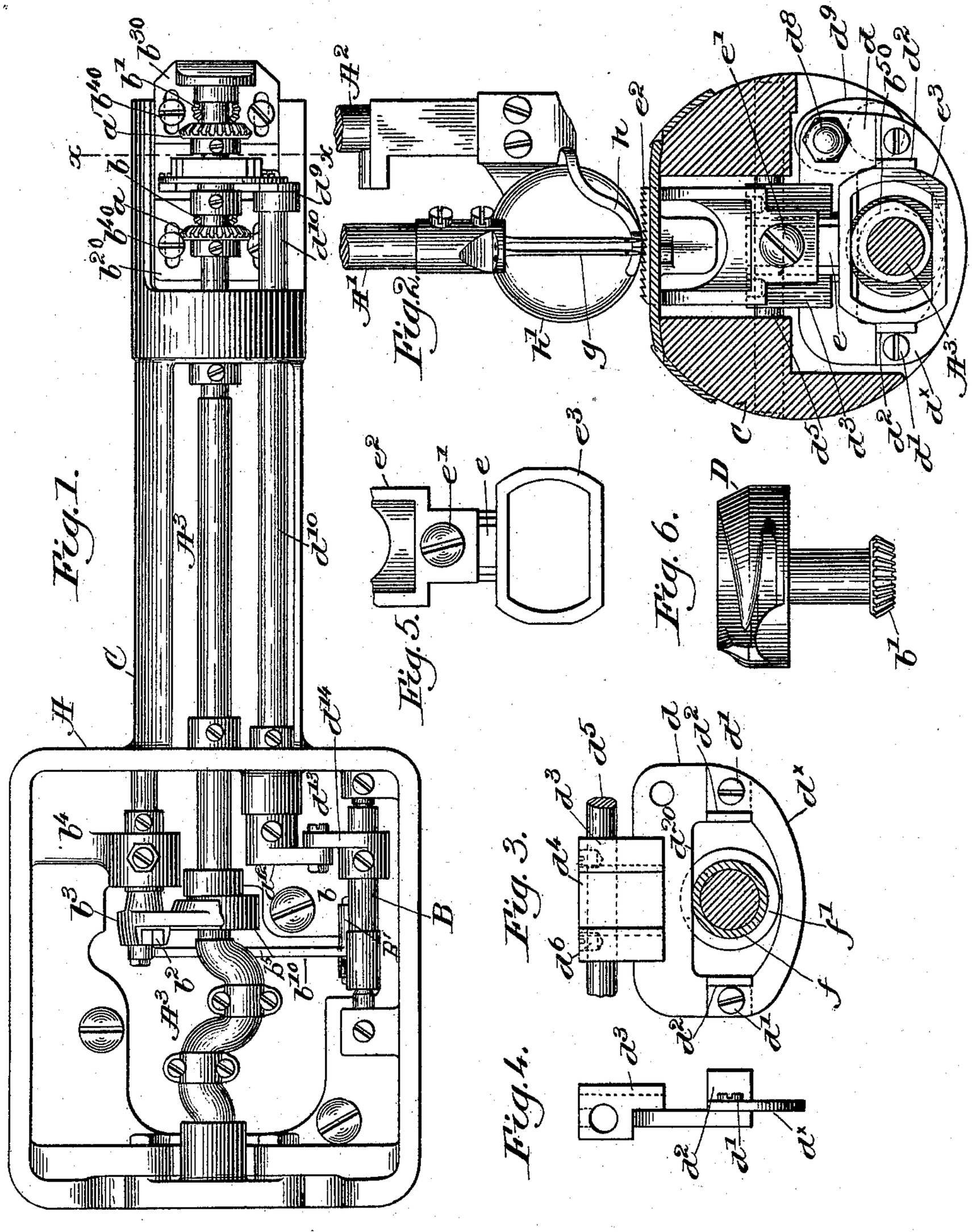
(No Model.)

G. H. DIMOND & W. F. DIAL.

FEEDING MECHANISM FOR SEWING MACHINES.

No. 604,005. Patented May 10, 1898.



Witnesses:
A. C. Harrison
Thos. J. Drummond.

Inventors:
George H. Dimond.
Wilbur F. Dial.
by Hornby & Gregory. Attys.

UNITED STATES PATENT OFFICE.

GEORGE H. DIMOND AND WILBUR F. DIAL, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS TO THE WHEELER & WILSON MANUFACTURING COMPANY, OF SAME PLACE.

FEEDING MECHANISM FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 604,005, dated May 10, 1898.

Application filed February 2, 1897. Serial No. 621,680. (No model.)

To all whom it may concern:

Be it known that we, GEORGE H. DIMOND and WILBUR F. DIAL, of Bridgeport, county of Fairfield, State of Connecticut, have invented an Improvement in Feeding Mechanism for Sewing-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

In the production of sewing-machines employing a horizontal cylindrical arm on which the material, principally shoes or clothing, is placed and acted upon by a presser-foot while being stitched great difficulty has been experienced in feeding the work accurately. The feeding-dog in this class of machines has commonly been rocked on a pivot, and consequently the dog engaging the under side of the material under the presser-foot to feed the material has been moved in an elliptical path. For the best and most satisfactory work the feeding-dog, especially when feeding light-weight material, should be so actuated as to engage the material held down by the presser-foot and draw the material uniformly and steadily during the feeding operation.

In our investigations, seeking to improve this class of machines, we found that owing to the small diameter of the cylindrical arm and the limited space in which the feeding device might move the feed-points of the feeding-dog release their hold on the material too soon after the said points pass the needle, this being on account of the elliptical motion imparted to the feed-dog, and we also discovered that this difficulty might be remedied by insuring a straight horizontal movement throughout of the feeding device during the feeding operation, for the longer the teeth hold the material in front of the needle the less the liability of the material slipping or puckering in the operation of making the stitch. Accordingly we have devised a feeding mechanism or device in which we employ a feed-dog carrier which is moved always in a horizontal plane, but for a greater or less distance, according to the length of the stitch desired, and said carrier, provided with suitable vertically-arranged guideways, receives in it a feed-dog provided with removable points, said feed-dog having only a vertical movement in said carrier. The carrier has an open center through which is extended a shaft provided with a cam which imparts vertical movement to the feed-dog to lift the same just before or as the carrier is started in its horizontal movement to effect the clamping of the material between itself and the usual presser-foot preparatory to feeding the material, the said cam holding up said dog with its feed-points against the work during the feeding movement, and the work having been fed for the length desired for the stitch the said cam immediately lets the said feed-dog drop, so that the teeth leave the work, and this done the carrier is returned to its starting-point. The carrier is herein shown as reciprocated positively horizontally by an arm of an auxiliary rock-shaft which we have added to this machine for such purpose.

The machine herein to be described employs a needle-bar having one or more eye-pointed needles, and within the cylindrical arm we have placed two circularly-moving loop-takers, each mounted upon a vertical shaft and containing a bobbin-case to hold a second thread, and said loop-takers are moved by devices connected with vertical shafts having at their lower ends small bevel-pinions, which are driven each by a bevel-gear fast on the main under shaft of the machine, the said main under shaft having also upon it between the said bevel-gears the feed-dog raising and lowering cam.

The particular features in which our invention especially consists will be hereinafter more fully described, and pointed out in the claims at the end of the specification.

Figure 1 is an under side view of part of the base of the machine and the cylindrical arm. Fig. 2 is a somewhat-enlarged section in about the line *x*, Fig. 1, it showing the cylindrical arm, some of the parts in it, together with the presser-bar, needle-bar, and devices carried thereby. Fig. 3 is a detail showing the carrier detached and the shaft which it surrounds in section. Fig. 4 shows the carrier in edge view. Fig. 5 shows the feed-dog and its at-

tached plate, having the feed-points broken off; and Fig. 6 shows the loop-taker and its shaft.

Referring to the drawings, A represents, it may be, a part of the framework, from which rises the usual overhanging arm, supporting at its front end the needle-bar A′ and the presser-bar A^2.

The framework A has suitable bearings for the reception of a crank-shaft A^3, deriving its movement in this instance, let it be supposed, from a rotating shaft in the overhanging arm through two links connected with the double crank of the shaft A^3.

The frame A contains within it, in suitable bearings, a rock-shaft B, having extended from one side of it an arm B′, provided with a stud-screw *b*, over which is passed one end of a link b^{10}, having at its other end a stud provided with a loose block b^2, which slides in a groove in a segment-lever b^3, having its shank extended loosely through a suitable ear or bearing b^4, the said segment-lever being forked to embrace a cam b^5, mounted on the shaft A^3, so that as said shaft rotates it swings the segment-lever and causes it to move the link b^{10} backward and forward and rock the shaft B. This link and rock-shaft, having the segment-lever b^3, are common to United States Patent No. 331,174, dated November 24, 1885, and herein in practice the length of the feed stroke may be regulated as therein provided for.

We will now describe more particularly our improvement.

The frame or base A has preferably fast with and projecting from it a cylindrical arm C, and said shaft A^3 is extended into said cylindrical arm and is provided with two like bevel-gears *a* and *a*′, which engage two like bevel-pinions *b b*′, each attached to a vertical shaft having its bearings in suitable adjustable carriages b^{20} b^{30}, each carriage being held in its adjusted position by suitable screws b^{40}, one of said shafts and its pinion *b*′ being shown detached in Fig. 6. The upper ends of the vertical shafts upon which these bevel-pinions *b* and *b*′ are fixed are provided each with a suitable loop-taker D, as represented in Fig. 6, said loop-takers in practice each containing within it, as represented in United States Patent No. 578,136, dated March 2, 1897, a suitable thread-case provided with a cop or bobbin of thread.

The bevel-gears *b* and *b*′ are of such size with relation to the bevel-pinions driven by them that the loop-takers referred to have two rotations to one rotation of the shaft A^3. This shaft A^3 is provided with a cam b^{50}, (see Fig. 2,) said cam being employed for imparting vertical movement to the feed-dog, to be described.

Heretofore in machines employing loop-takers having circular movement in horizontal planes it has been customary to rotate the vertical shafts by actuating said loop-takers from a short horizontally-arranged shaft driven from the main shaft of the machine through a large toothed gear and pinion; but herein, owing to the limited space afforded in the cylindrical arm and in order to enable the vertically-movable feed-dog to be actuated properly, we were obliged to change the usual construction referred to, and we therefore extend the shaft A^3 and apply directly to it the bevel-gears *a* and *a*′ and place the cam b^{50} between said gears.

The cylindrical arm is provided with a feed-carrier *d*, shown detached in Figs. 3 and 4 and as composed of two pieces united by suitable set-screws *d*′, one of said pieces $d^{\times}$ being provided with suitable ears or lugs d^2, which serve as guides, as will be hereinafter described. Said carrier at its upper edge is also provided with an extension d^3, which is grooved vertically, as at d^4, to thus provide a guideway in which may reciprocate vertically the feed-dog *e*. The carrier in this instance is further provided with a fixed guide-rod d^5, it being attached to the extension d^3 by suitable screws d^6, the ends of said guide-rod having a sliding fit in holes made transversely through the cylindrical arm. The carrier has a hole in which is secured a stud d^8, embraced by an arm d^9 of an auxiliary rock-shaft d^{10}, said auxiliary rock-shaft having at its inner end a second arm d^{12}, provided with a suitable stud d^{13}, which engages a slot in an arm d^{14}, attached to the rock-shaft B, before referred to.

To enable us to slide the carrier *d* horizontally, as required, within the limited space allowed in the cylindrical arm, we were obliged to add to the rock-shaft B the arm d^{14} and joint it with the arm d^{12} of the rock-shaft d^{10}.

The feed-dog *e* has attached to it by a suitable screw *e*′ what we call a "feed-point" e^2, it having a series of projecting teeth, (fully represented in Fig. 2,) the said teeth standing in substantially a horizontal plane, and as the said dog rises it engages the under side of the material held down by the presser-foot *h*.

The lower end of the feed-bar has a strap e^3, which surrounds the shaft A^3 and embraces the cam b^{50} thereof, and the side edges of the strap coöperate with ears or lugs d^2, the latter serving to guide and maintain the straight-line movement for the feed-dog. This feed-dog is, however, fitted to slide in the guide-way constituted by the groove d^4 in the extension d^3 of the feed-carrier.

As stated, the carrier has a movement only in a horizonal plane; but the feed-dog is moved in a vertical plane in said carrier, and at the same time it partakes also of the horizontal movements of the said carrier. Just about as the material is to be engaged and moved for the length of a stitch the cam b^{50} operates to lift the feed-dog in the carrier, and then the carrier is moved to feed the material while the feed-dog is elevated, so that throughout the feeding movement of the feed-dog the

teeth firmly engage the material and draw it uniformly, not permitting any slip or backward movement, and the feed having been completed the cam b^{50} arrives in such position in its rotation as to let the feed-dog drop, and then the carrier is returned to its starting position. The movement of the carrier back and forth is made positive, and the vertical movement of the feed-dog in the carrier is also a positive movement, the use of springs being unnecessary.

In order to positively guide the carrier in its movements, so that it may not move longitudinally with relation to the length of the shaft A^3, we have provided the said shaft with a collar f, having a groove f', in which latter enters the edge d^{20} of the carrier, (see Fig. 3,) said edge always remaining in said groove during the movements of the carrier.

The needle-bar A′ is herein shown as provided with two needles g, and the presser-bar A^2 has a foot h and a roller-presser h', the said needles and foot and presser being of usual construction.

It is obvious that should a person desire to sew but one seam instead of two parallel seams one of the needles may be omitted.

The needles g, as herein shown, are set one a little distance back of the other or obliquely with relation to the line of feed in order that each needle may present its thread to its own loop-taker.

Having fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a sewing-machine, a cylindrical arm for the reception of the work, a presser-foot, a feeding mechanism comprising a carrier provided with a horizontally-arranged guide and having a vertical guideway and two attached ears or lugs to constitute guides, and a feed-dog having at one end a cam-strap and at its opposite end a feed-point, which, as it is raised, engages the material under the presser-foot, the shank of said feed-dog entering the guideway of the carrier and the strap fitting between the said ears or lugs; combined with means to reciprocate said carrier horizontally and an independent rotatable shaft having a cam located in said strap and acting only on said feed-dog to impart to it vertical movement in said carrier, substantially as described.

2. The cylindrical arm, the transversely-movable carrier therein having a horizontally-arranged guide adapted to slide in said arm; the shaft A^3 having a cam b^{50}; a rock-shaft B having an attached arm d^{14}, means to actuate said rock-shaft; an auxiliary rock-shaft parallel therewith and extended into said cylindrical arm, and provided at its rear end with an arm d^{12} which is joined at d^{13} to the said arm d^{14}, said auxiliary rock-shaft having at its front end an arm, and connections between said arm and said carrier, whereby said carrier is moved back and forth by or through the said auxiliary rock-shaft, and the feed-dog mounted in said carrier is moved vertically through the action of said cam b^{50}, substantially as described.

3. In a sewing-machine, a rotating shaft A^3 provided with a cam b^{50} and with a grooved collar, a cylindrical arm, through which said shaft is extended, a carrier composed of two parts d and $d^{\times}$ and slotted to slide horizontally on said shaft, one of said parts entering the groove of said collar, said carrier also having a vertically-arranged guideway, an auxiliary rock-shaft extended through said cylindrical arm, means to actuate said rock-shaft and connections between said rock-shaft and said carrier to enable the said auxiliary rock-shaft to move the carrier horizontally, combined with a feed-dog fitted to be moved vertically in the guideway of the said carrier and acted upon by the cam on the said shaft A^3, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GEORGE H. DIMOND.
WILBUR F. DIAL.

Witnesses:
ISAAC HOLDEN,
GEO. CORNWELL.