Nov. 18, 1924. 1,515,732

J. COOPER

DRIVING MECHANISM FOR THE LOOP TAKING HOOK IN LOCKSTITCH SEWING MACHINES

Filed April 25, 1922

Fig. 2.

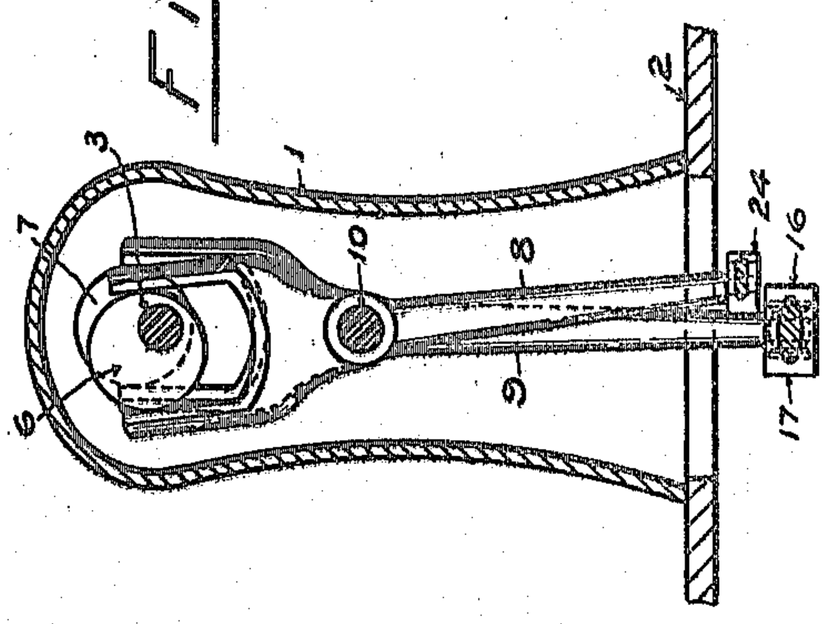


Fig. 3.

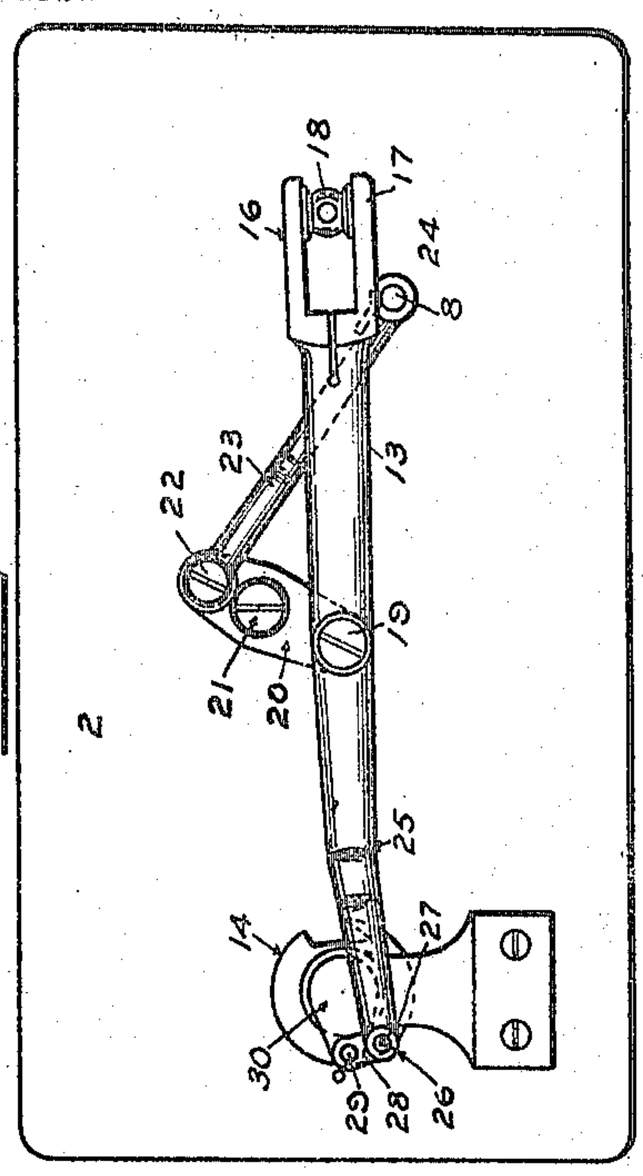


Fig. 1.

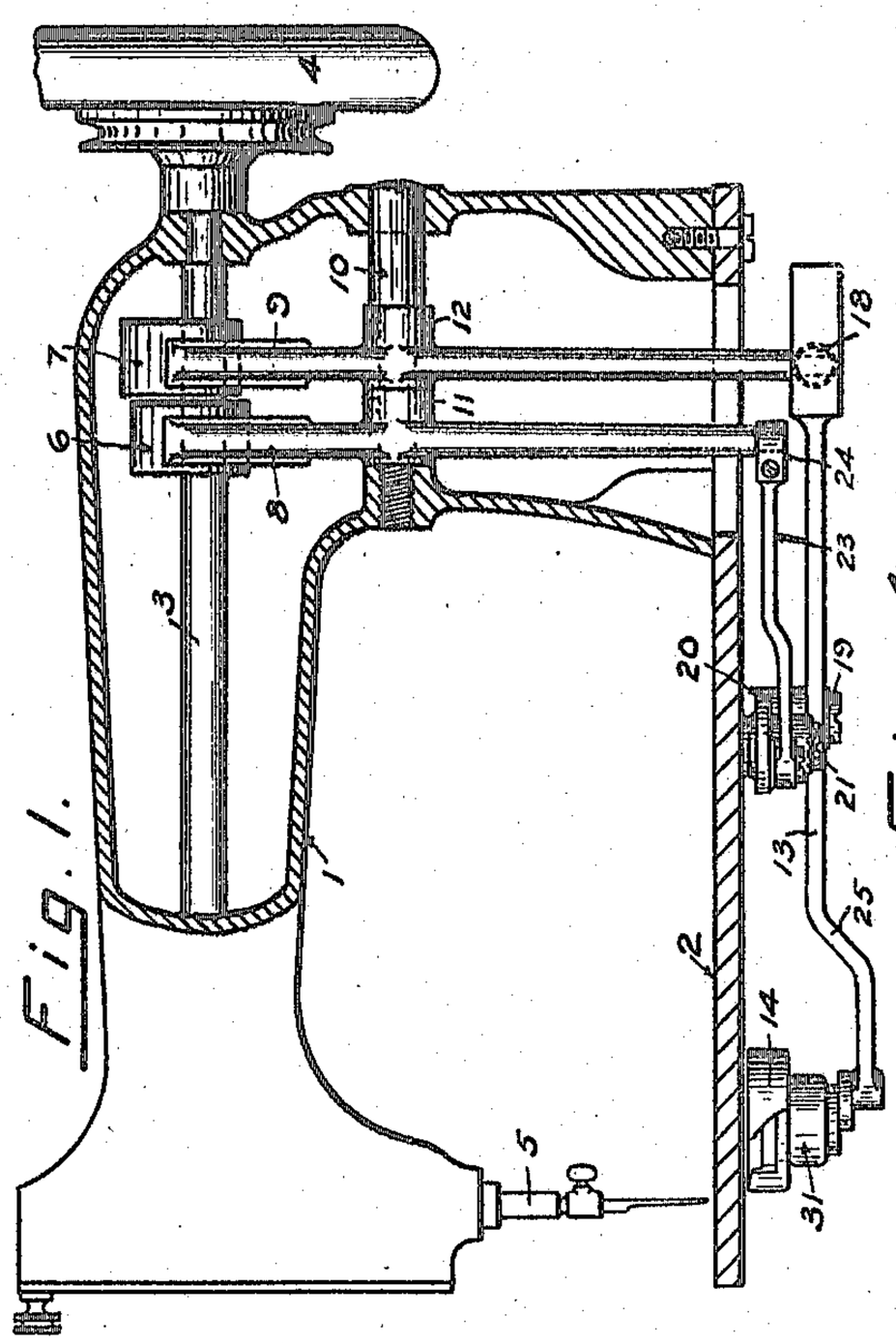
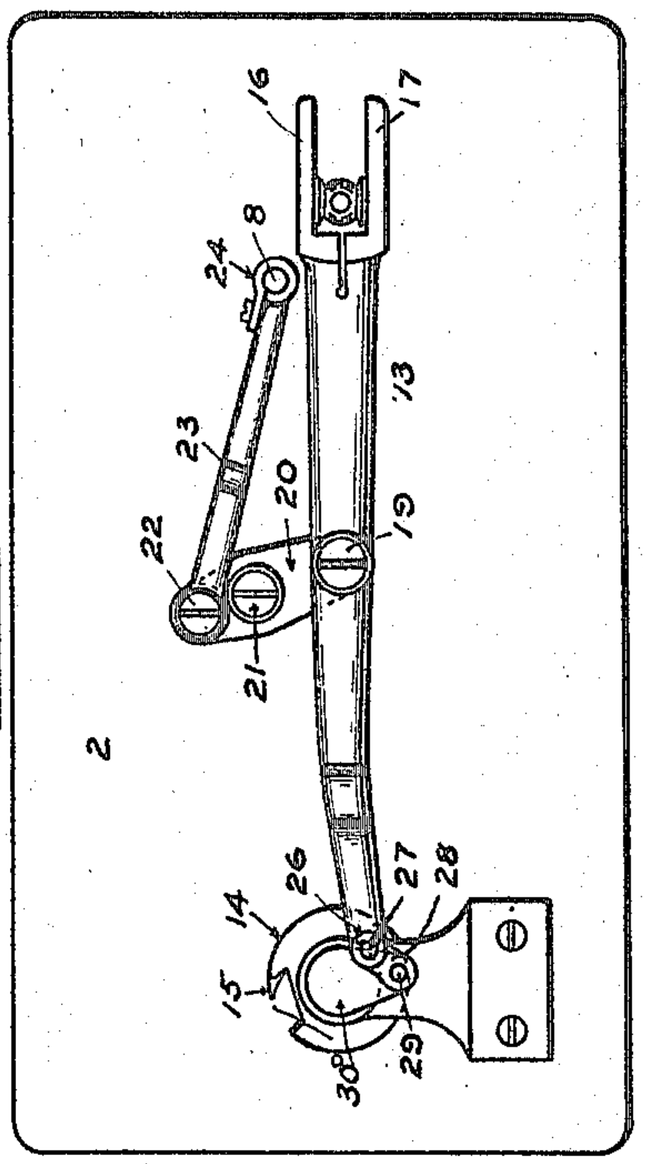


Fig. 4.



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UNITED STATES PATENT OFFICE.

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DRIVING MECHANISM FOR THE LOOP-TAKING HOOK IN LOCKSTITCH SEWING MACHINES.

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To all whom it may concern:

Be it known that I, JOSEPH COOPER, a subject of the King of Great Britain and Ireland, and a resident of Ashton-under-Lyne, in the county of Lancaster, England, have invented a certain new or Improved Driving Mechanism for the Loop-Taking Hook in Lockstitch Sewing Machines, of which the following is a specification.

In sewing machines having a rotary hook which engages the needle thread loop to spread the same around the casing containing the underthread, it has been customary with hooks rotating around a vertical axis to rotate the said hook by means of a bottom shaft to which rotation was imparted from the top or driving shaft of the machine through a crank or cranks, bevel or other gearing being interposed between the bottom shaft and the rotating member which is formed with or which bears the hook. The result has been that when the inevitable wear took place in the various bearings and gear teeth, the stitch became irregular, and the timing of the machine, that is, the correct relation of the movements of the hook, the needle, and the take up lever—which are of course all driven from the top shaft of the machine—was no longer maintained, and these parts did not act in unison for the correct formation of the stitch. Further the manufacture and machining and assembly of the various parts has been found extremely expensive.

The present invention relates to an improved driving mechanism for the rotary hook in such sewing machines, and which mechanism, whilst simple in construction, and inexpensive, will obviate the difficulties hitherto experienced and as mentioned above. In carrying it into effect I provide driving mechanism for a rotary hook which has motion around a vertical axis, and which driving mechanism comprises a bottom shaft pivoted about midway of its length to a link which is itself pivoted to the underface of the sewing machine plate. The bottom shaft is therefore capable of rocking motion around its own centre and at the same time capable of motion around the supporting center of the swinging link, that is, approximately, in the direction of its own length. Means are provided for giving the bottom shaft these two motions simultaneously, from the top shaft of the sewing machine, the resultant of the said motions being that a rotary motion is given to any point of the bottom shaft and consequently to the rotary hook member which is suitably connected to one end of the bottom shaft.

The drive is suitable for a rotary lock stitch sewing machine in which an ordinary spool, specially wound, is used for the underthread, or in a machine of that type known as the two reel or twin bobbin wherein a reel or cheese of thread as it comes from the manufacturer is used in a suitable casing for the underthread.

A convenient method of carrying the invention into effect will now be described with reference to the accompanying drawings, wherein:—

Figure 1 is a front elevation of a sewing machine showing the improved drive as applied thereto;

Figure 2 is an end view, looking from the left, of part of the mechanism shown in Figure 1;

Figure 3 is a bottom plan of the sewing machine showing that part of the mechanism which is below the bedplate of the machine in one position; and

Figure 4 is a similar view of the same mechanism in another position.

In the drawings, which are to scale, only so much of the sewing machine arm is shown as is required for the purpose of description of the improved drive.

Referring to the figures, 1 is the arm of the machine, and 2 the bedplate. 3 is the top or driving shaft driven by hand or power through the balance wheel 4. 5 is the needle shaft as usual.

6, 7, are drums which are fitted eccentrically upon the top shaft 3 to act as face cams—their degree of eccentricity to the axis of the said top shaft 3 being equal—and occupying a position relative to each other as shown in Figures 1 and 2. 8 and 9 are driving levers, bifurcated at their upper extremities as shown clearly in Figure 2, the bifurcated ends of these levers embracing the eccentric drums 6 and 7 as shown in that figure. A central bearing shaft 10 is provided within the arm of the machine, its ends being fitted therein as shown or in any convenient manner, the levers 8 and 9 being adapted to oscillate freely on the said shaft by means of the bush bearings 11 and 12 to which bushes the said levers are secured. Ro-

tation of the top shaft will thus, through the drums 6 and 7, give a vibratory motion to both levers 8 and 9 around their centres 10. Suitable oil holes may be provided in the bushes 11 and 12.

13 is the bottom shaft of the machine which gives motion to the member 14 on which the loop taking hook 15 is formed. The said bottom shaft is bifurcated or slotted to provide arms as shown at 16, 17 to form a slide or guide for the slide block 18, the sliding faces of which are machined to form an accurate and at the same time easy sliding fit within the slide. The centre portion of the slide block 18 is spherical and forms a bearing for the end of lever 9 as shown by Figures 1 and 3, and the lower extremity of the rocking lever 9 fits therein in such a manner that whilst slight movement of the said extremity is permitted within the spherical portion of the slide member, there is no looseness of the said lever extremity within the said spherical bearing.

The bottom shaft 13 is pivoted at 19 by means of a stud as shown to the extremity of a link 20 which is itself pivoted at 21 by means of a stud to the underface of the bedplate 2 of the machine. This link 20 is pivoted as shown, to the bedplate, viz: about midway of its length, and to the other end thereof is pivotally secured at 22 the lever 23, which latter is provided at its other extremity with a bearing 24 for the lower end of the oscillating lever 8. The bearing 24 may be similar to the bearing in the slide block 18.

The bottom shaft 13 is cranked at 25 to allow of that end thereof which is to drive the rotary hook to engage, by means of a socket bearing 26, with a stud 27 secured in a short link 28, the other end whereof is pivoted at 29 upon a crank pin of a crank piece 30 formed solid with the circular block member 31 which is adapted to support the rotary member 14 which bears or has formed thereon the rotary hook 15. Other crank means may however be employed to communicate the motion of shaft 13 to the rotary hook 15.

Assuming that the bottom shaft is in the position shown in Figure 3 and considering the Figures 1 and 2, it will be seen that when the shaft 3 is rotated in a clockwise direction, as viewed from the view point of Figure 2, the cams 6 and 7 will in their rotation cause the levers 8 and 9 to oscillate upon the bearing 10, by reason of the engagement of the upper bifurcated ends of the said levers with the cams 6 and 7. The bifurcated arms are made an easy sliding fit upon the faces of the cams 6 and 7 and are always in contact therewith. The effect of this oscillatory motion of the lever 9, the lower end whereof is fitted within the bearing of the slide block 18, is to cause this slide block to move transversely to the bottom shaft 13 and describe a shallow arc, but as the said slide block is a sliding fit within the slide recess 16—17 (Figures 3 and 4) the bottom shaft 3 is constrained to move radially around its pivotal point 19 with continued movement of the lever 9, the slide block 18 displacing itself longitudinally to the bottom shaft 13 within the recess 16—17, as the said bottom shaft moves around its centre. At the same time the lever 8 through the link 23 rocks the link 20 around its pivotal point 21, with the result that the bottom shaft 13 not only has a radial movement around its pivotal point 19, but at the same time through the displacement of the lever 23 by the movement of lever 8 the point 19 moves a number of degrees of arc, of which arc the point 21 is the centre. These movements taking place simultaneously, the various members will assume the position shown in Figure 4, from which it will be seen that the crank 30 has moved 90 degrees of its complete revolution. Movement of the levers 8 and 9 and their connected parts continuing, one revolution of the crank 30 will take place, through the intermediary of the connecting members and the bottom shaft 13 when the levers 8 and 9 have each effected one complete vibration or double oscillation around their centre 10.

The relative positions shown in the drawings of the rocking levers 8 and 9 are those I have found in practice suitable to give the effect desired, that is to say, the locum extremity of the lever 8 lags behind that of the locum end of lever 9 in its traverse in both directions. I do not however confine myself to the exact relation shown should any variation in special circumstances be found expedient. Further, the relative dimensions of the various members comprising the mechanism may be varied if found necessary or desirable for any particular purpose, without departing from the spirit of my invention.

As will be seen, the mechanism above described is not only simple in construction, but its nature permits of all of its members being constructed in cast iron, with a minimum of machining and consequent lessening of cost as compared to hitherto employed driving means for rotary hooks.

I claim:

1. Improved driving means for the rotary loop taking hook of a lockstitch sewing machine, comprising a cam on the top shaft, an oscillating lever actuated by said cam and imparting oscillatory motion to a pivoted lever which bears the pivoting means for the bottom shaft of the machine, and thus giving oscillating motion to the whole of the said bottom shaft, and a similar oscillating lever similarly actuated the lower end

of which slides in a recess in the free end of the bottom shaft and gives oscillatory motion to the latter around its own pivotal centre, for the purpose set forth.

2. Improved driving means for the rotary loop taking hook of a lockstitch sewing machine, comprising a cam on the top shaft, an oscillating lever actuated by said cam and imparting oscillatory motion to a pivoted lever which bears the pivoting means for the bottom shaft of the machine, and thus giving oscillating motion to the whole of the said bottom shaft, a similar oscillating lever similarly actuated the lower end of which slides in a recess in the free end of the bottom shaft and gives oscillatory motion to the latter around its own pivotal centre, a rotary member bearing the loop taking hook, a supporting member for the said rotary member, said supporting member having a crank formed solid therewith, and a pivoted link connecting the crank and the bottom shaft.

3. Improved driving means for the rotary loop taking hook of a lockstitch sewing machine, comprising two cams mounted on the top shaft of the sewing machine, two levers each of which is bifurcated at its upper end, and the said upper end embracing one of the cams, a bearing within the sewing machine arm on which bearing the two levers are adapted to oscillate in parallel planes, a lever pivoted upon the bottom plate of the machine and pivotally connected to the lower end of one of the said oscillatory levers, and a bottom shaft pivotally carried by the lever pivoted upon the bottom plate and having a recess in one end thereof in which recess the lower end of the other bifurcated lever slidably fits to give oscillatory motion to the bottom shaft around its pivotal centre.

In testimony whereof I have hereunto set my hand.

JOSEPH COOPER.