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ROTARY HOOK FOR SEWING MACHINES

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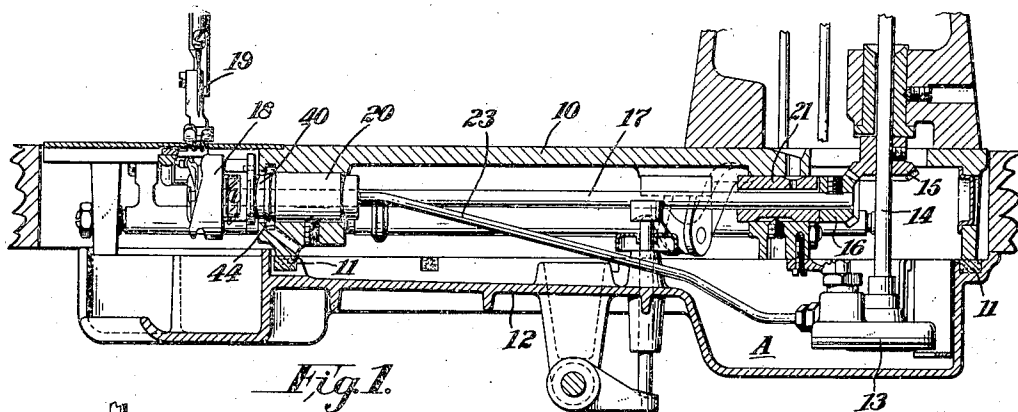


Fig. 1.

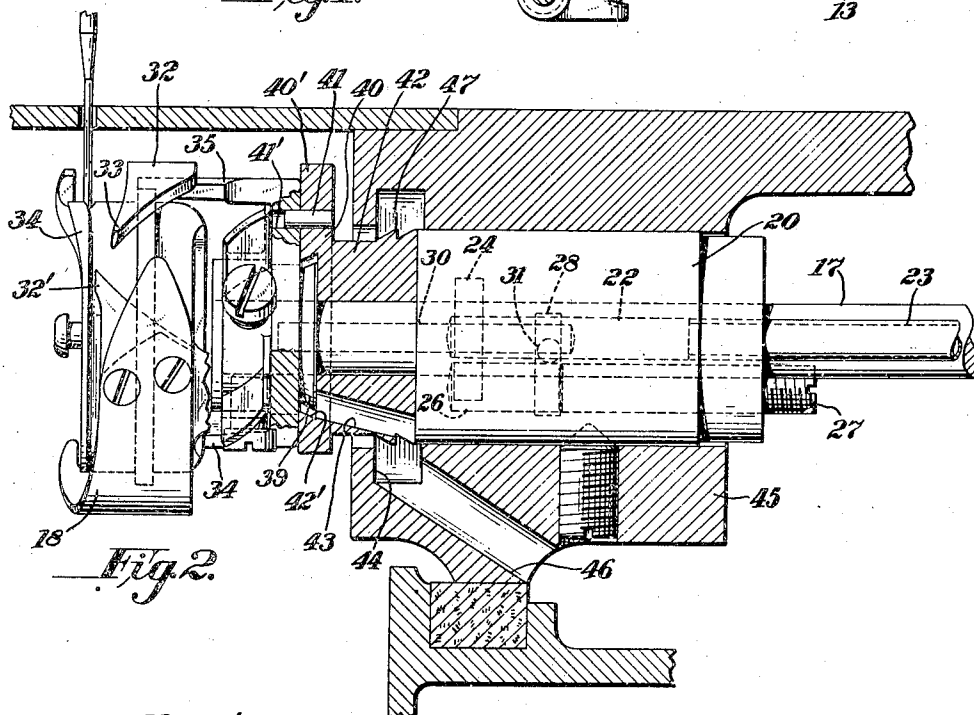


Fig. 2.

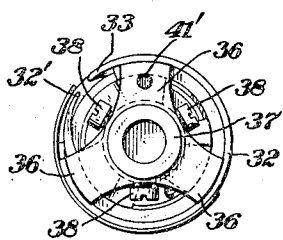


Fig. 3.

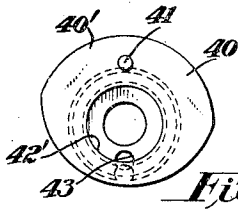


Fig. 4.

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ROTARY HOOK FOR SEWING MACHINES

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4 Claims. (Cl. 112—256)

This invention relates to sewing machines and more particularly to rotary hooks therefor and has for its objective the provision of improved means for balancing a hook for the purpose of reducing vibration, and to arrange the balancing means so that the hook may be timed relative to the needle without disturbing the relation between the balancing means and the hook.

Another object of this invention is to provide improved means for collecting excess oil thrown off by the hub of the hook and returning it to the lubricant reservoir of the machine.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawing of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the drawing: Figure 1 is a vertical section taken through the frame of the machine, some of the parts of the operating mechanism being shown in elevation.

Figure 2 is an enlarged side elevation of the hook, the hook-actuating shaft, and a bearing bushing for the hook, the depending lug of the bed in which the bushing is fixed being shown in section.

Figure 3 is an elevation of the back side of the hook.

Figure 4 is a front elevation of the counter-weight used to balance the hook.

In the embodiment of this invention selected for illustration, 10 represents the bed-plate of a sewing machine formed with depending side and end walls which rest upon a gasket of resilient material 11 carried by the oil-pan 12. The bed of the machine, together with the oil-pan, form an oil-tight compartment which houses the actuating mechanism of the machine.

Carried by the bed 10 of the machine is a centrifugal pump 13 actuated by the usual vertical shaft 14 which has its upper end operatively connected to the needle-bar actuating shaft (not shown). The shaft 14, through the gears 15 and 16, actuates the hook-shaft 17 which is journaled in the bearing bushings 20, 21 carried by the bed. Fixed to the end of the shaft 17 is a rotary hook 18 which cooperates with the usual reciprocating needle 19 in the formation of lock-stitches.

The bearing bushing 20 is formed with a conduit 22 which is connected with the centrifugal pump 13 by the tube 23 so that, when the machine

is operating, oil is supplied from the reservoir A by the centrifugal pump 13 through the tube 23 and to the conduit 22 under pressure. The conduit 22 communicates with an internal circular groove 24 which is formed in the bushing and supplies oil to the bearing surface between the bearing bushing 20 and the shaft 17. The bearing bushing is also formed with a conduit 26 which is tapped to receive a screw 27. The conduit 26 is arranged below the level of the hook-shaft 17 and connects the circular groove 24 with a second groove 28 which is formed slightly eccentric relative to the shaft 17 so that its outer periphery will intersect the conduit 26 but will not intersect the conduit 22. The shaft 17 is formed with a longitudinally arranged bore 30 and a radial conduit 31 which communicates with the circular groove 28 in the bearing bushing 20. The oil is supplied through the radial duct 31 and longitudinal bore 30 to the raceway in the hook in the usual and well known manner. For a more detailed description of the means for supplying oil to the bearing bushing for the shaft and the raceway in the hook, reference may be had to the copending application of Peets et al., Serial No. 280,488, filed June 22, 1939.

The hook 18 is formed with the usual rim portion 32 having a loop-seizing beak 32' and loop-controlling tail 33, the rim portion being cut away at the point between the beak and loop-controlling tail to provide a space or gap for entrance of the needle-thread so that it may be passed about the thread-basket 34. The rim 32 is carried by a cup-shaped hook-body comprising the laterally extending arms 35 formed integral with the radial arms 36 which are carried by the hub 37. The hub 37 of the hook is apertured to receive the shaft 17 and is adjustably secured thereto by means of the set-screws 38 so that it may be adjusted relative to the needle 19. Located between the bearing bushing 20 and the hub of the hook is a counterweight 40 which is caused to rotate with the hook by means of a pin 41 which enters a hole 41' formed in one of the radial arms 36 of the hook. The counterweight is formed with an eccentric flange 40' and a concentric hub 42 provided with a bore which receives the hook-shaft 17, and the eccentricity of the flange is arranged so that when the hook and counterbalance are rotated they are in balance at all times. On the face of the flange 40' adjacent the hook, there is formed a circular undercut groove 42' which receives the oil-sling 39 formed on the hub of the hook. Communicating with the circular groove 42' is an out-

wardly inclined conduit 43 which terminates adjacent the bearing bushing 20 and opens into a circular groove 44 formed in the lug 45 which carries the bearing bushing 20. The groove 44 has connected therewith a downwardly inclined conduit 46 which has its discharge end within the chamber defined by the bed 10 and the oil-pan 12.

From the above it will be obvious that if oil should creep along the hook-shaft 17 from the bearing bushing 20 during the operation of the machine, some of the oil from the bearing will be thrown off by means of the oil-sling 47 formed on the counterbalance, and oil which finds its way to the hook or escapes between the hook and the shaft 17 will be thrown off by the oil-sling 39 and caught in the undercut circular groove 32. This oil, due to centrifugal force, will travel along the conduit 43 and be thrown into the circular groove 44 formed in the bearing lug 45. The oil thus collected in the oil-groove 44 is returned to the reservoir A by the downwardly inclined conduit 46. It will thus be seen that my improved counterbalance acts not only to balance the hook and thus reduce vibration, but also collects and returns escaping lubricant to the oil reservoir in the base of the machine. It will also be understood that the set-screws 38 may be loosened and the hook beak 32 adjusted relative to the needle. As the counterbalance 40 is free to move around the shaft and is adapted to rotate with the hook through the pin connection, the counterbalance moves with the hook and the balancing relation between these two rotatable bodies is not disturbed when the hook is adjusted.

Having thus set forth the nature of the invention, what I claim herein is:

1. In a sewing machine, in combination, a rotatable shaft, a rotary hook adjustably secured to

said shaft, and a counterbalance encircling and carried by said shaft and detachably secured to said hook whereby said hook may be adjusted relative to said shaft without disturbing the relation between said hook and counterbalance.

2. In a sewing machine, in combination, an oil reservoir, a hook-actuated shaft, means for supplying oil from said reservoir to said shaft, a rotary hook secured to said shaft and having an oil-sling formed thereon, a counterbalancing element carried by said shaft and rotatable with said hook, said element having a groove which surrounds said oil-sling and means connected to said groove for returning the oil collected by said groove to the reservoir.

3. In a sewing machine, in combination, an oil reservoir, a hook-actuated shaft, means for supplying oil from said reservoir to said shaft, a rotary hook secured to said shaft and having an oil-sling formed thereon, and a counterbalancing element carried by said shaft and rotatable with said hook, said element being formed with a groove which surrounds said oil-sling, and an outwardly inclined conduit communicating with said groove for conducting oil through centrifugal action to the reservoir of the machine.

4. In a sewing machine, a rotary shaft, a bearing in which said shaft is journaled, a hook secured to said shaft and having a gap in its rim portion which produces a state of unbalance of the hook and shaft when they are rotated, a counterweight located between said bearing and said hook and encircling said shaft, and means for detachably securing said counterweight in a predetermined position relative to said hook and shaft to produce a state of balance in the shaft when it is rotated.

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