Dec. 25, 1945. H. L. BAGWELL 2,391,379

SEWING MACHINE

Filed Nov. 21, 1942 3 Sheets-Sheet 1

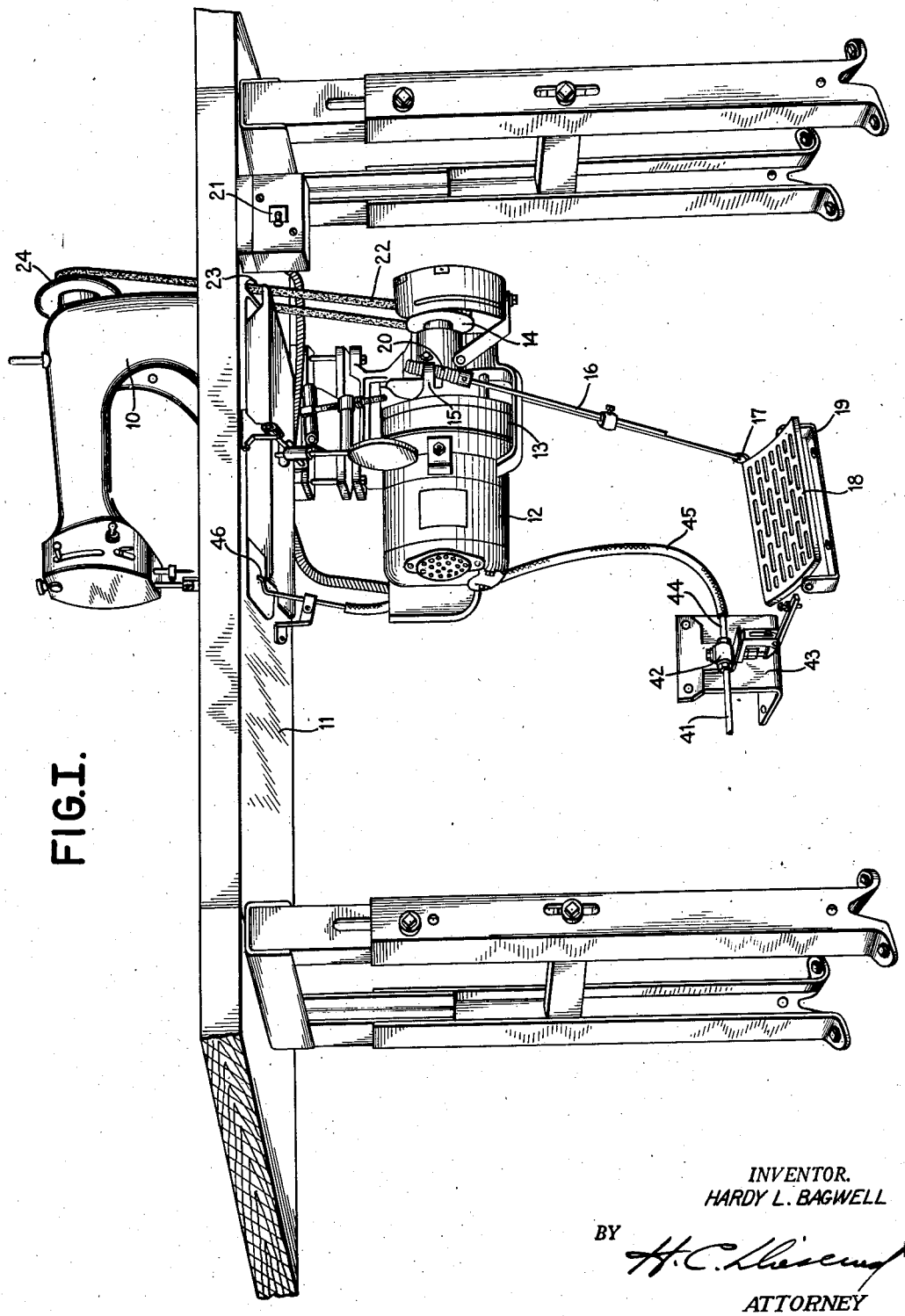


FIG. I.

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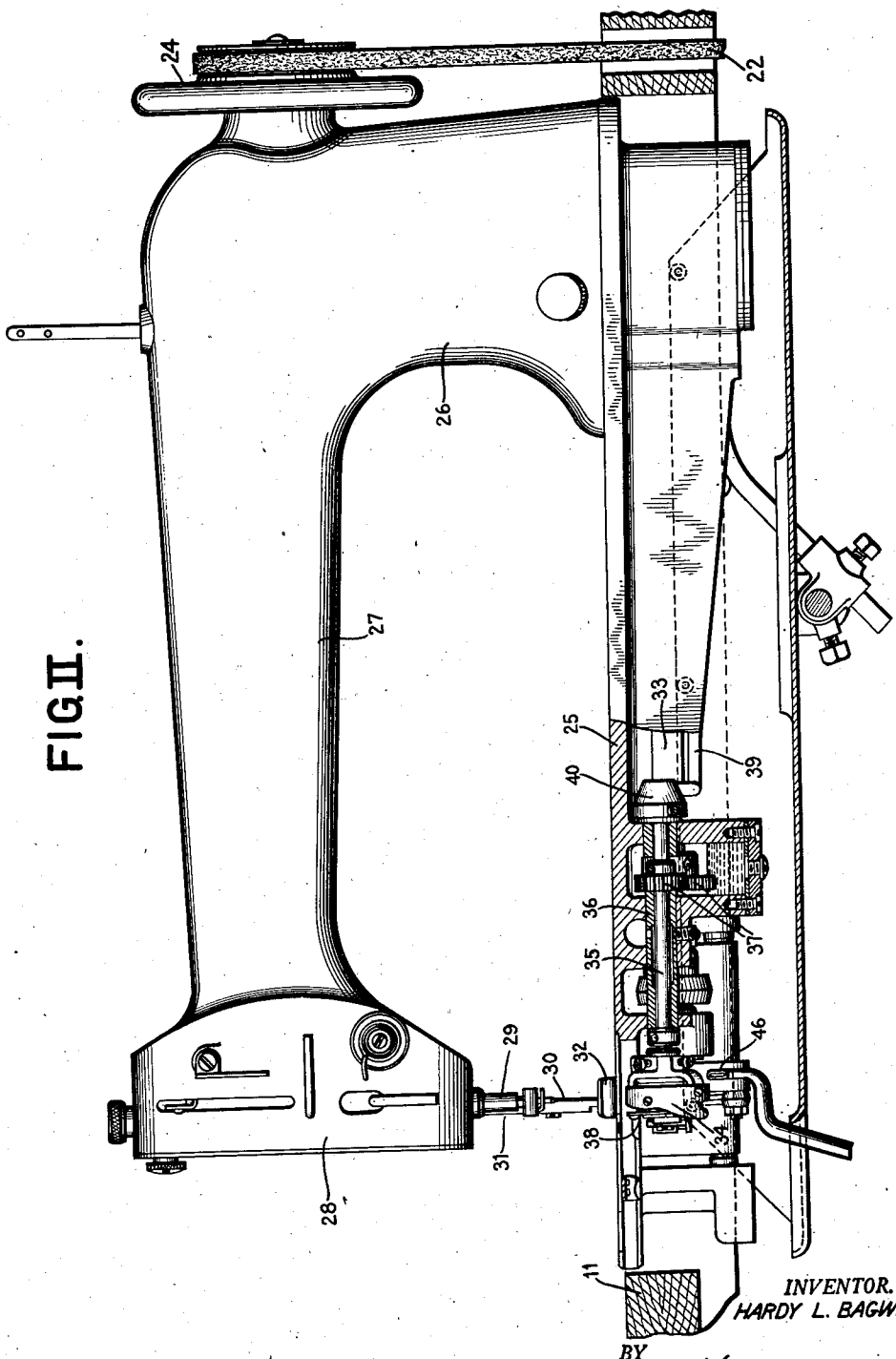
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FIG II.



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FIG. IV.

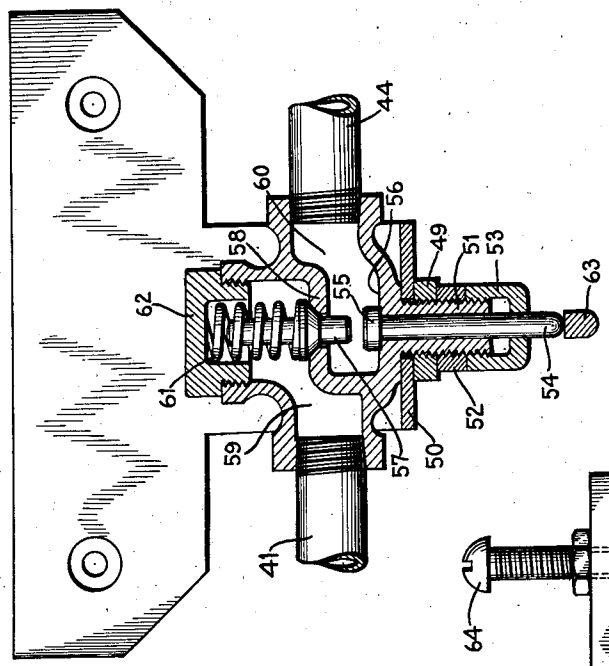
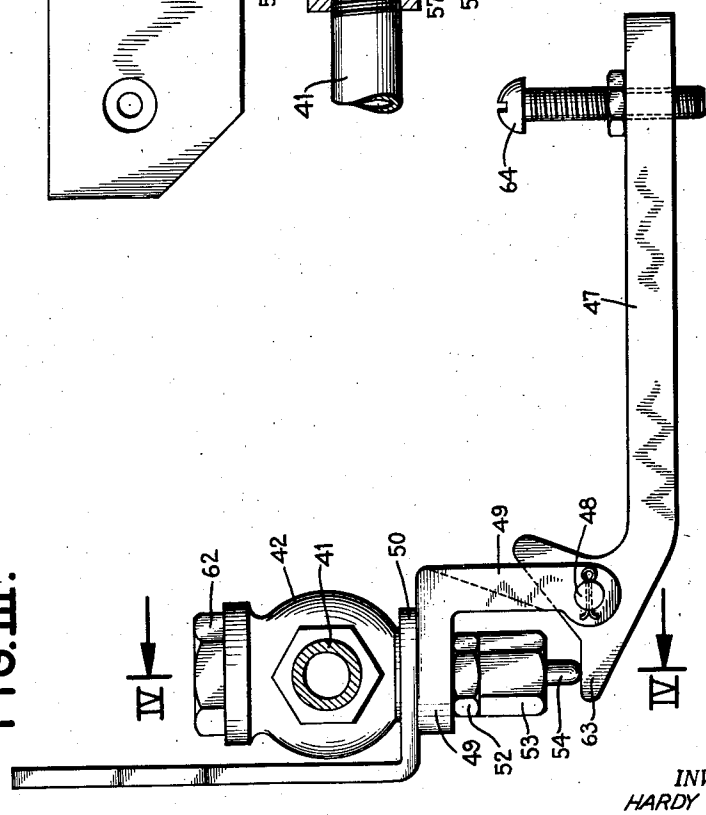


FIG. III.



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UNITED STATES PATENT OFFICE

2,391,379

SEWING MACHINE

Hardy L. Bagwell, Ware Shoals, S. C., assignor to Union Special Machine Company, Chicago, Ill., a corporation of Illinois

Application November 21, 1942, Serial No. 466,439

3 Claims. (Cl. 112—218)

This invention relates to sewing machines and more particularly to improved devices for preventing the overheating of rotary hooks employed in lockstitch machines.

A primary object of the invention has been to provide a simple and inexpensive construction, which is economical in use, for directing a stream of cooling air against a rotary hook. Through the use of the improved cooling means, the heat generated between the bearing surfaces of the rotary and stationary components of the hook is effectively dissipated and, accordingly, the permissible speed of operation of the machine is increased. The invention is particularly concerned with that type of hook in which a raceway is provided in the rotating component to cooperate with a rib on the stationary bobbin holder and in which the rotating component, or loop taker, is revolved at twice the angular speed of the needle operating shaft. The speed of operation of such machines is frequently limited by the tendency of the hook to overheat, with the result that its temper is drawn and the device rendered useless.

An important feature of the invention is the provision of control means by which the delivery of air for hook cooling purposes is made responsive to the actual operation of the sewing instrumentalities of the machine. Toward this end connections are provided from the treadle which controls the operation of the sewing machine for simultaneously controlling a valve in the air supply line.

Other objects, features and advantages of the invention will appear from a detailed description of an illustrative form of the same which will not be given in conjunction with the accompanying drawings, in which:

Fig. I is a perspective view showing a sewing machine and its operating and controlling devices mounted on a table, all constructed and arranged in accordance with the invention.

Fig. II is a view showing the sewing machine largely in side elevation but with a portion in vertical section along the axis of the rotary hook.

Fig. III is an enlarged, detail view in side elevation, showing the air-control valve and its supporting and operating means, and

Fig. IV is a vertical section through the air-control valve along the line IV—IV of Fig. III.

Referring now to the drawings, a sewing machine 10, of any suitable construction, is mounted upon a table 11 or other appropriate support. Beneath the top of the table there is mounted a driving unit comprising an electric motor 12 and a clutch 13. These may be of any known and appropriate construction, such as disclosed in the patent to Peets et al., No. 2,004,055, granted June 4, 1935, or in the application of LeVesconte et al., Ser. No. 449,196, filed June 30, 1942. Associated with the clutch is a pulley 14 which is adapted to be driven by the motor 12 whenever the clutch is engaged. Engagement of the clutch may suitably be effected by the rocking of an arm 15 which is adapted to be drawn downwardly by a rod 16 connected at 17 with a treadle 18 pivotally carried by a frame or bracket 19 on the floor beneath the sewing machine. The connection between the rod and the arm 15 may be made of a yielding character, by the provision of springs 20. A spring, not shown but forming part of the clutch unit, serves to normally retain the rod 16 and the treadle 18 in the position indicated in Fig. I, in which the clutch is disengaged and the machine is idle. The motor 12, however, may be in operation at this time due to the closing of a control switch 21. A belt 22 connected with the pulley 14 and passing upwardly through a slot 23 in the table is connected with a combined hand wheel and pulley 24 carried by the main drive shaft of the sewing machine. Accordingly, whenever the treadle is operated to engage the clutch, the sewing machine will be driven to effect the desired stitching.

For purposes of illustration a sewing machine of the type disclosed in the patent to Christensen, No. 2,113,572, granted April 12, 1938, has been selected. This may comprise a main base portion 25, a vertical standard 26, and an overhanging arm 27 projecting laterally from the upper end of the standard and extending over the work supporting surface of the base 25. The overhanging arm may be provided at its end with a needle head 28 carrying a needle bar 29, with one or more needles 30, for vertical reciprocation by appropriate connections from the main driving shaft of the machine. A presser bar 31 carrying a presser foot 32 at its lower end is spring-urged downwardly in a conventional manner to retain the work against the work support and in cooperative relation with work feeding means. Suitable connections are provided from the main drive shaft to a shaft 33 in the base of the machine, the latter shaft being connected appropriately with the work feeding devices and the rotary hook. The latter may comprise a rotating component 34 which is secured to a shaft 35 mounted in a bearing sleeve 36 carried by the base of the machine. Gearing 37 serves to connect the shaft 35 with shaft 33, the ratio of the

gears being such that shaft 35 will be given two revolutions for each revolution of the shaft 33 or for each reciprocation of the needle bar 29. Within the rotating component 34 of the hook is mounted a stationary component 38 which serves as a bobbin holder and is provided on its outer, cylindrical surface with the usual ribs (not shown) for cooperation with a raceway in the inner surface of the rotating component. If desired, provisions may be included for the lubrication of the raceway between the rotating and stationary components of the hook and this may comprise a conduit 39 adapted to deliver lubricant from an oil cup, suitably positioned adjacent the standard 26, to a cap 40 mounted upon or forming a part of a bearing for the inner end of the hook shaft. The latter may suitably be provided with an axial bore, as disclosed in the patent to Smith, No. 2,089,167, granted August 3, 1937, through which the lubricant is delivered to the raceway. For further details as to the construction of the foregoing features of the machine, reference may be had to said Christensen and Smith patents.

When the raceway is properly lubricated, the hook, and hence the machine, may be operated at a higher speed without overheating than when no lubrication is provided. However, even with proper lubrication, the temperature of the hook will rise materially in the formation of long seams at speeds of the character now commonly employed. For the purpose of dissipating this heat and thus enabling operation at still higher speeds, air derived from any suitable source is directed in appropriate volume against the base or inner surface of the hook. To accomplish this, a pipe line 41 may be provided, this being arranged to deliver air from a compressor unit, or a tank containing compressed air, or the like, to a valve 42 mounted on a frame 43 secured to the floor beneath the work table 11. From the opposite side of the valve a pipe 44 delivers the air, when the valve is open, to a hose line 45 having its discharge end 46 positioned in rear of and slightly below the rotary hook, as indicated in Fig. II. Thus, whenever the valve 42 is opened, air will be blown across the back of the rotary component of the hook, and into the interior of the same as the openings in its wall pass the end of the hose, and will thereby produce a desired cooling effect. It will be understood that if necessary, the air may be cooled after compression and before delivery to the hook. By delivering the air against and into the hook in the indicated manner, disturbance of the thread loop formed about the bobbin case in the course of stitch formation is avoided, or at least reduced to a minimum.

For the purpose of operating the valve 42, a lever 47 is provided, this being pivoted upon a pin 48 carried by a forked portion of a bracket 49 which is secured to an outwardly bent portion 50 of the frame 43. The valve, the bracket 49, and the supporting frame are preferably secured together by providing the valve with a downwardly extending, threaded stem 51 which passes through an aperture in the portion 50 of the frame and through an aperture in a horizontal portion of the bracket 49. Beneath the latter is a nut 52 which retains the parts in assembled relation. A cap member 53, beneath the nut 52, serves both as a lock nut for the latter and as a guide for the lower end of a pin 54 which extends axially through the stem 51 and is slidable freely therein. The upper end 55 of the pin 54 is enlarged and is normally retained by the lower wall 56 of the valve. Axially in line with the pin 54 is a closure element 57 having a conical portion arranged to cooperate with a conical seat in an intermediate partition 58 in the valve housing. This partition serves to divide the interior of the valve housing into two chambers, including an inlet chamber 59 and an outlet chamber 60. A spring 61, surrounding the stem of the element 57 and cooperating at one end with the enlarged closure portion of the latter and at the opposite end with a cap 62 at the top of the inlet chamber of the valve, serves normally to hold the valve in closed condition. However, when the lever 47 is rocked clockwise (Fig. III), extension 63 thereof engages the lower end of pin 54 and the latter, in turn, engages the element 57 and raises it from its seat, against the action of spring 61. Rocking of the lever 47, for this purpose, is accomplished by the engagement of the rearward portion of the treadle 18 with an adjustable screw 64 mounted on the lever adjacent its forward end. By properly adjusting the screw 64, the time of engagement thereof by the treadle may be varied, as desired, to suit particular requirements. Ordinarily the adjustment should be such that the screw will be engaged and the valve operated just as the clutch is engaged to cause operation of the sewing machine. However, if desired, the adjustment may be such as to cause opening of the valve either before or after the clutch has been fully engaged. In any event, however, the opening of the valve to deliver cooling air to the hook will occur as an incident to the operation of the hook and the delivery of air will continue only so long as the hook remains in operation or, possibly, a brief interval thereafter. Wastage of air, which would result from a continuous flow even during brief idle periods in the operation of the machine, is thus avoided. Adequate cooling is effected, particularly with the air under substantial pressure, to allow the desired increase in speed of operation of the machine.

The operation of the machine is believed to be clear from the foregoing so that a résumé is unnecessary.

While a specific embodiment of the invention has been described in considerable detail it will be understood that numerous changes may be made in the construction and arrangement of the several parts without departing from the general principles and scope of the invention.

What I claim is:

1. In apparatus of the class described a lockstitch sewing machine having a rotary hook, power operated means for driving said machine, manually controlled means for delivering power to said power operated means, a treadle having a substantial range of movement for controlling the operation of said machine by said power operated means, means for delivering a blast of air against said rotary hook, a valve for controlling the operation of said air delivering means, an operating lever connected with said valve, and adjustable means on said lever arranged to be engaged by said treadle at a selected point in its range of movement to open said valve as an incident to operation of the machine, said means being capable of adjustment to bring about opening of said valve prior to engagement of the clutch.

2. In apparatus of the class described a lockstitch sewing machine having a rotary hook, said hook having rotating and stationary components in bearing engagement, the rotating component

having a base with openings into the interior thereof and being given two revolutions for each cycle of operation of the machine, a motor and clutch unit for driving said machine, manually controlled means for supplying current to said motor, a treadle, connections from said treadle for controlling the engagement and disengagement of said clutch, means for delivering air under pressure from an air line to said hook and directing the same upwardly and transversely across the base of the rotating component at a point relatively close thereto, a valve for controlling the delivery of air by said means, and means for opening said valve in response to operation of said treadle to engage said clutch.

3. In apparatus of the class described a lockstitch sewing machine having a rotary hook, said hook having rotating and stationary components in bearing engagement, the rotating component being given two revolutions for each cycle of operation of the machine, a motor and clutch unit for driving said machine, manually controlled means for supplying current to said motor, a treadle, yielding connections from said treadle for controlling the engagement and disengagement of said clutch, means for delivering air under substantial pressure to a point closely adjacent to said hook and directing the same across the base of the rotating component, a valve for controlling the delivery of air by said means, and adjustable operating means for said valve arranged to be operated by said treadle in variable relation to and as an incident to the engagement of said clutch, said means being capable of adjustment to bring about opening of the valve prior to engagement of the clutch.

HARDY L. BAGWELL.