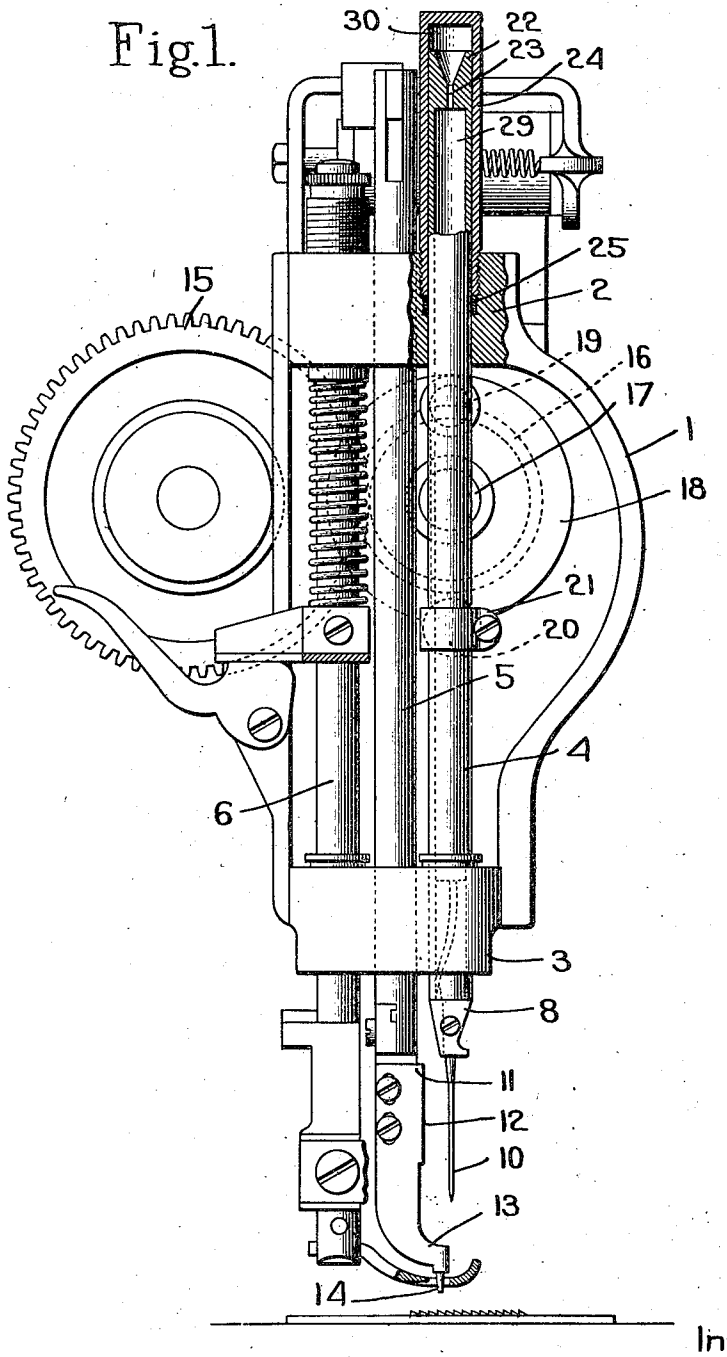
Oct. 2, 1928. 1,686,439

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BLOWER ATTACHMENT FOR MACHINES

Filed March 7, 1923 2 Sheets-Sheet 1

Fig.1.




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Fig.2.

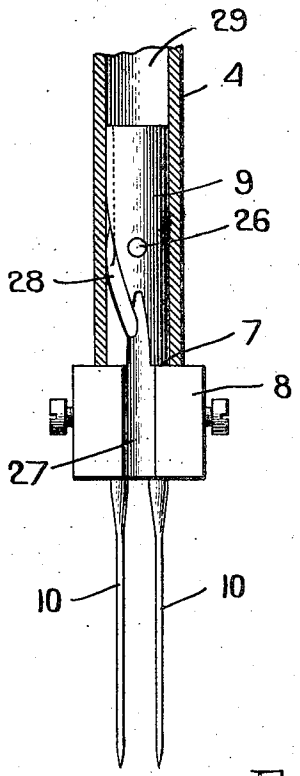



Fig.3.

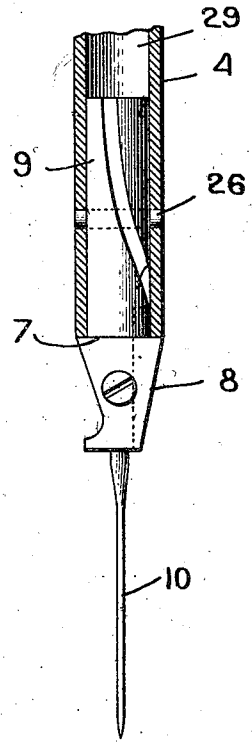
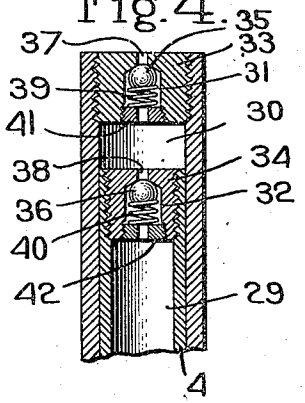



Fig.4.




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# UNITED STATES PATENT OFFICE.

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## BLOWER ATTACHMENT FOR MACHINES.

Application filed March 7, 1923. Serial No. 623,355.

This invention relates to a machine having as one of its parts a hollow reciprocable bar, and the object thereof is to construct such a machine with the hollow reciprocable bar used to force a jet of air in the vicinity of the field of action of punches, needle points, or other tools used on the machine.

One object of the present invention is to provide a pump device for blowing a jet of air in the vicinity of a tool used on a machine having a hollow reciprocable bar without the addition of any auxiliary structure to the machine.

A further object of the present invention is more particularly to provide a stitching and perforating or similar machine having a new and improved device for blowing a jet of air in the vicinity of the tool operating on the work.

A further object of the present invention is to provide a stitching and perforating or other machine, with a new and improved device for blowing the loose material such as the punchings, or threads, from under the points of the punch, needle, or other tool.

A further object of the present invention is to change one of the essential parts of a stitching, perforating or other machine in such a manner that it forms a pump for forcing a draft of air in the vicinity of a tool used on the machine and thus does away with auxiliary pumping devices.

Other objects and features of the invention will more fully appear from the following description and accompanying drawings and will be particularly pointed out in the claims.

The drawings illustrate both in perspective and detail a preferred form of the invention adapted for use in a stitching and perforating machine and embodying the broad principles of the invention.

In the drawings:

Fig. 1 is a side elevation of a stitching and perforating machine showing a sectional view of the pumping device of the present invention;

Fig. 2 is a front elevation of the needle bar and block;

Fig. 3 is a side elevation of the needle bar and block;

Fig. 4 is a modification of the pump, with valves to control the admission and emission of the air to and from the pump chamber.

Only such mechanism is illustrated as is necessary to show the invention itself as applied to a stitching and perforating machine. A machine in connection with which a preferred form of the present invention is particularly useful is fully described and claimed in my Patent No. 1,523,931, granted January 20, 1925, but the invention is not limited to use with this machine and may be used in any machine having a reciprocable member where it is desirable to direct a blast of air at a desired point as to blow loose material away from the work being operated upon as in the present instance, or for any purpose.

The mechanism illustrated herein is designed to be used on a machine having a reciprocable member and a fixed barrel or sleeve, in which the top of the member reciprocates, to compress air in the barrel between the reciprocable member and the end of the barrel, and blow the air through and out of an orifice, in the other end of the reciprocable member to which a tool may be attached, as, for example, into the vicinity of the field of action of the tool to cool the tool or blow loose material, either dirt or small pieces of the work-material, from under the tool. The barrel has been used heretofore merely as a protection for the operator of the machine, to form a stationary guard for the end of the reciprocable member and prevent injury to the operator by the reciprocable member striking him.

As illustrated herein the invention is attached to a stitching and perforating machine having a frame with a head, 1, and upper and lower needle bar guides, 2 and 3 respectively. In the head are mounted, one behind the other a vertically reciprocable needle bar, 4, a vertically reciprocable punch bar, 5, and a vertically movable presser-foot bar, 6. At the lower end of the needle bar is a needle holder, 7, consisting of a block, 8, and a shank, 9, in which are fastened the needles, 10, and at the bottom of the punch bar is a punch holder, 11, comprising a vertical shank, 12, terminating in a forwardly projecting foot, 13, in which are mounted hollow steel punches, 14.

The punch bar is reciprocated by means including a gear, 15, and a pinion, 16, in the manner fully set forth in the co-pending application referred to above. The main drive shaft, 17, carries the usual disk, 18, provided with a stud, 19, eccentric to the drive shaft and connected by a link to a stud, 20, on a collar, 21, carried by the needle bar. It is obvious that movement of the disk is trans-

mitted to the needle bar and that when the eccentric stud, 19, is near its upper or lower position the needle bar has a relatively slow movement which occurs during the end portion of each reciprocation, but when the eccentric stud is at a position midway between its upper and lower positions the needle bar has a relatively rapid movement, which occurs during the middle portion of each reciprocation.

This invention as attached to a stitching and perforating machine, is preferably applied to the vertically reciprocable needle bar. The needle bar is made in the form of a tube, of any material which will stand the wear, and the fact that it is in the form of a tube causes it to be very light in weight besides making it adaptable for the purposes of the invention. In the preferred form of the invention shown in Fig. 1, the upper end, 22, of the needle bar is closed except for a restricted opening, 23, and reciprocates in a barrel, 24, which fits tightly around the bar and is secured to the upper needle bar guide by means of threads cut on the bottom of the barrel engaging the complementary threads cut in the guide. The barrel seats against a packing, 25, to prevent air from escaping when compressed in the barrel by means of the upward movement of the reciprocating needle bar. In the form of the invention illustrated in Fig. 1 the top of the barrel is permanently closed and air is both sucked in and blown out through the hollow needle bar in which the bar reciprocates.

In the lower end of the needle bar is the needle holder, heretofore mentioned, which is fastened in the needle bar by means of a pin, 26, extending through the shank of the holder and projecting into openings in the needle bar. A restricted orifice, 27, is formed between the needles in the block and extends upwardly through the shank nearly to the pin, 26, which holds the needle block to the needle bar, and the orifice is so positioned that a blast of air issuing therefrom will blow in the vicinity of the field of action of the tool, in this case the needles, to blow loose material from under the needles. A groove, 28, is formed longitudinally along the surface of the shank and communicates at its lower end with the orifice, 27, and at its upper end with the hollow interior or chamber, 29, of the needle bar, so that air under pressure in this chamber is conducted around the pin, 26, and may easily pass through and escape from the orifice in the needle block. The groove is preferably of the shape shown so that when it is formed the shank of the needle holder and the pin for keeping the holder in the needle bar remain as strong as possible.

When the needle bar moves downwardly during the normal operation of the machine air is sucked into the chamber, 29, through the orifice, 27, and groove, 28, and passes on into the upper chamber, 30, presented by the interior of the barrel, 24; then when the needle bar moves upwardly the air is compressed in the chamber, 30, and flows in the reverse direction through the chamber, 29, and groove, 28, and issues from the restricted orifice, 27, in a blast which blows any loose material, such as punchings or threads, from under the needles.

The movement of the needle bar is such that the cycle, including both the upward and downward stroke, may be divided into four parts: First, a period of rapid upward movement when the bar is near the mid position of the upward stroke and during which the needles are being withdrawn from the work; second, a period of relatively slow movement when the bar is near and at the top of its stroke and during which the needles are held above the work; third, a period of rapid downward movement when the bar is near the mid position of the down stroke and during which the needles puncture the work; fourth, a period of relatively slow movement when the bar is near and at the bottom of its stroke and during which the needles are buried in the work.

When the machine is just being put in motion with the needle bar at the extreme limit of its downward movement, the chamber, 30, is opened up to its largest capacity and is filled with air. As the bar slowly rises at the beginning of the stroke the air is slightly compressed in the chamber, 30, and a small amount of it gradually escapes through the restricted opening, 23, in the head of the needle bar into the chamber, 29, but the large majority of the air remains in the chamber, 30.

The period of slow movement is followed by the period of rapid upward movement during which the air remaining in the chamber, 30, is quickly and highly compressed.

The period of rapid upward movement merges into the period of slight movement when the bar is near and at the top of its stroke at which time the air in chamber, 30, is under great compression and escapes through the restricted opening in a blast, the force of which is communicated to the air in the chamber, 29, causing a like blast to be emitted from the restricted orifice, 27, for blowing loose material from under the needles. It will thus be seen that due to the practically closed-off upper end of the needle bar and way in which the needle bar is reciprocated that no appreciable amount of air issues from the orifice, 27, until the needles have been raised above the work, and that when the air does come out, it issues as a forceful blast instead of a slow steady stream to blow the loose material from the portions of the work which will be punctured by the next stroke of the needle.

When the needle bar is on its downward

stroke the same action takes place in the reverse direction. No appreciable amount of air is sucked into the chamber until the needle bar is down toward the lower end of its downward movement.

The modification shown in Fig. 4 is the same in all its essentials as the form shown in Fig. 1, except that valves, 31 and 32, are formed in the top of the barrel and the top of the needle bar respectively. The valves are formed in plugs, 33 and 34, and consist of small balls, 35 and 36, held against openings, 37 and 38, by means of springs, 39 and 40, which bear against smaller apertured plugs, 41 and 42, held in the bottoms of the larger plugs. When these valves are used the air is sucked into the chamber 30, through the opening, 37, and the upper valve, 31, and when the chamber is full the spring, 39, reseats the ball, 35, so that the air impounded may not escape through the top of the barrel. On the upward stroke of the needle bar, the valve, 32, operates to permit the air to escape from the chamber, 30, into the chamber, 29, from which it passes through the groove, 28, and orifice, 27, to blow material from under the needles as heretofore described.

In the operation of the modification shown in Fig. 4 the flow of the air on the compression, or upward, stroke of the needle bar is the same as that described for the preferred form of the invention shown in Fig. 1 but on the downward, or suction, stroke of the needle bar the air does not have to pass through the chamber, 29, in order to enter the chamber, 30, and so it enters the chamber, 30, in a fairly steady stream from the time that the difference in pressure between the air on the outside of the barrel and the vacuum in the chamber, 30, is sufficient to overcome the force of the spring, 39, until the pressures in the chamber and outside are practically equal.

It will thus be seen that a very simple pump is formed of parts already used in the making of the machine with the reciprocable member forming a movable element of the pump, and although a particular form of the invention has been illustrated it is obvious that changes may be made without departing from the spirit of the invention. The invention, as applied to a stitching and perforating machine, has been used on the needle bar but it may be equally well applied to any other hollow reciprocating bar on this machine, or to a like part on any other machine, where it is desirable to blow loose material away from the work being operated upon, or for any other purpose. Since the invention is of general application and has many uses, it is desired that it be construed as broadly as the limitations in the claims, taken in conjunction with the prior art, may allow.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

1. In a machine of the character described, a hollow reciprocable bar with a tool and a restricted orifice at the lower end, and means acting upon and induced by the reciprocation of the bar to compress air above said bar and force it through the hollow bar and out through the orifice, in the vicinity of the field of action of the tool.

2. A stitching and perforating machine having a reciprocable punching bar, a reciprocable needle bar, one of said bars being hollow and means co-operating with the head of the hollow bar acting when the bar is reciprocated to force a jet of air through said bar to blow away the punchings.

3. In a machine of the character described, a hollow reciprocable bar with a restricted orifice at its lower end, a tool carried by the lower end of said bar, and a fixed barrel in which the upper end of said bar reciprocates, having its upper end acting to prevent the escape of air therefrom, and its lower end fitting over the bar, the barrel and bar co-operating to compress air above said bar and force it through the hollow bar and out through said orifice to blow loose material from under said tool.

4. In a stitching machine having a head, a reciprocable hollow needle bar having an orifice at its lower end, a needle carried by the lower end of the bar, a barrel closed at its upper end and fixed to the head, in which the upper end of the needle bar reciprocates, the barrel and bar co-operating to compress air above said bar, and force it through the hollow bar and out through said orifice to blow loose material from under said tool.

5. In a stitching machine, a movable hollow needle bar, a needle block held in the lower end of the needle bar, and having an opening longitudinally therethrough, said opening communicating at one end with the hollow in the needle bar, and at the other end presenting an orifice in the needle block so positioned that a jet of air issuing from said orifice will blow loose material from under the needle.

6. A stitching machine comprising a head, a movable hollow needle bar, a needle block held in the lower end of the needle bar, and having a groove longitudinally therethrough, said groove communicating at one end with the hollow in the needle bar, and at the other end presenting a restricted orifice in the needle block, a barrel fixed on the head and in which the upper end of the needle bar moves, the said barrel and bar co-operating to force a draft of air through the needle bar and groove and from said orifice to blow loose material from under the needle.

7. In a machine of the character described, a hollow reciprocable bar with a restricted orifice at the lower end, and a head having a restricted opening therethrough at the upper end, a fixed barrel in which the upper end of said bar reciprocates having its upper end

acting to prevent the escape of air therefrom, and its lower end fitting over the bar, the barrel and bar co-operating on the up stroke of the bar to compress air above said head and force it out through the orifice at the lower end in a blast.

8. A machine having the construction defined in claim 7 together with means for varying the reciprocation of the bar to produce a relatively rapid movement during the middle portion and a relatively slow movement during the end portions of each reciprocation, thus insuring a rapid compression of the air above the head and time for the discharge of the blast when the air is at substantially full compression.

9. A machine of the character described comprising a hollow reciprocable bar with a restricted orifice at the lower end and a head having a restricted opening therethrough at the upper end, a fixed barrel in which the upper end of said bar reciprocates having its upper end acting to prevent the escape of air therefrom, and its lower end fitting over the bar, the barrel and bar co-operating to cause a progressively increasing compression of air in said barrel as the head of the bar moves toward the upper end of the barrel, which will produce an effective blast of air from said orifice before and during the dwell of the reciprocating bar in the end portion of its upward movement, adapted to force a blast of air through the orifice at the lower end of the bar.

10. A machine of the character described comprising a hollow reciprocable bar with a tool at the lower end and a restricted orifice located in proximity to the tool and a head having a restricted opening therethrough at the upper end, a fixed barrel closed at its upper end in which the upper end of said bar reciprocates and its lower end fitting over the bar, the barrel and bar co-operating to produce a progressively increasing compression of air in said barrel which will be substantially ineffective during the initial movement of the head of the bar toward the upper end of the barrel and will produce an effective blast of air from said orifice when the air is highly compressed within said barrel prior to and during the dwell of the reciprocable bar at the end portion of its upward movement, whereby loose material in the vicinity of the tool will be blown away.

11. A machine of the character described comprising a frame, a hollow bar mounted to reciprocate in the frame, a tool on one end of the bar, means for reciprocating the bar, and means acting upon and induced by the reciprocation of the bar to force a jet of air through the bar at the tool end to blow in the vicinity of the field of action of the tool.

12. A machine of the character described comprising a frame, a hollow bar mounted to reciprocate in the frame, a tool on one end of the bar, means for reciprocating the bar, and means cooperating with the head of said bar and acting upon and induced by the reciprocation of the bar to force a jet of air through the bar at the tool end to blow in the vicinity of the field of action of the tool.

13. A machine of the character described comprising a frame, a hollow bar mounted to reciprocate in the frame and having a restricted orifice at its lower end, a tool at the lower end of the bar, means for reciprocating the bar, and pump means of which the upper end of the bar forms the movable element for forcing a jet of air through said bar and through the restricted orifice to blow in the vicinity of the field of action of the tool.

In testimony whereof, I have signed my name to this specification.

J. McP. COOKE.