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HAND TOOL FOR METAL ENGRAVING

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This invention relates to a hand tool for point engraving on metal, or any other hard surfaced material adapted more particularly, inter alia, for trading names and addresses on identity plates, stamp plates for bicycles, etc.

This tool presents the advantages of being very handy, owing to its simple construction, its convenient weight and its reduced size, while permitting to obtain rapidly and easily a very sharp engraving.

These advantages are achieved owing to the fact that while the engraving needle has a small stroke, it nevertheless strikes the plate to be engraved with a substantial force due to the feature consisting in that said engraving needle is actuated by percussion, by means of percutting members driven by pulses of air under pressure produced by an air machine.

Several embodiments of such a tool will be hereinafter described, being schematically shown in the accompanying drawing in which:

Fig. 1 is an elevation of a first embodiment of the tool, of which:
Fig. 2 is a diametral vertical section and,
Fig. 3 is a detail;
Fig. 4 is a diametral vertical section of a second embodiment of said tool; and
Fig. 5 is a side elevation of a machine for generating the air pulses used for driving the percutting members acting on the engraving needle.

According to the drawing and referring to the first embodiment (Figs. 1 to 3), 1 is a metal cylinder forming the handle adapted to be held pencil-like in the fingers of the engraver, 2 being a protecting threaded tip which permits the operator to extend the fingers as near as possible to the end of the engraving needle 3, thus facilitating the handling of the tool. The needle 3 is mounted, in any suitable manner, in a chuck 4, for example, at the end of a sliding rod 5, to which a forward motion is imparted in the cylinder 1 under the indirect control of the air pulses generated by the air machine, and whose return is effected through the action of a return spring 6 which is disposed in the cylinder 1 and housed therewithin.

The reciprocating motion of said stem 5 is limited, on the one hand, at its lower end protruding from the cylinder, by the collar 4' of chuck member 4, said collar and chuck being mounted by a screw thread or otherwise on said stem (this permitted, if necessary, to adjust the stroke of the needle 3) and on the other hand, the reciprocating motion is limited by a collar 7 at its upper end, which also protrudes from said cylinder 1.

The upper end of the handle 1 is topped by a metal cup 8, which is integral or integrally connected therewith, the inner circular edge of said cup being rounded. Said cup is covered and closed by a cover 9, whose inner circular edge is also rounded, these two parts being held with their edges in abutting relation by a threaded gland 10 and forming the head of the tool, the inner space of which forms a chamber 11 receiving the air pulses controlled and percussion driving members.

The driving members comprise, primarily, a flexible diaphragm 12, preferably of rubber, peripherally clamped between edges of the cup 8 and the cover 9, said diaphragm dividing the chamber 11 in two independent compartments.

Said diaphragm is vibrated under the successive compressive and exhaustive actions produced by the air machine, which actions are transmitted to the upper portion of chamber 11 by a flexible pipe 13 leading to a nipple 14 provided on the cover 9. In order to secure a uniform motion of said diaphragm whatever the starting position of the air machine may be, an air leak is provided, consisting in an adjustable air flow varying opening 15 in the cover 9, other openings 16 being similarly provided through the wall of the cup 8, in the lower compartment, as well as through the handle 1, in view of preventing any back-pressure acting on the diaphragm, due to air contained in said compartment or handle.

For driving the engraving needle 3 by percussion, two washer-like weights 17 are secured to the center portion and on either side of the vibrating diaphragm 12, said weights being connected together by means of a central screw 18 passing through said diaphragm, which is thus clamped and strengthened.

The diaphragm 12 is fixed towards the bottom of the cup 8 as each air puff is transmitted from the machine, thus causing the weight assembly 17 to strike the end of the rod 5 projecting into said cup, and this striking action, in turn, causes the engraving needle 3 to be projected from the tip 2. The downward or forward stroke of the members 3, 4 and 5 is limited by collar 7, whereas the upward or return stroke is limited by collar 4', said return stroke being effected by return spring 6.

In view of securing a good working of the tool, it is essential that the stroke of the diaphragm 12 be greater than that of the rod 5 (preferably
by an amount of the order of one tenth of a millimeter). For adjusting the amount of air flowing through the opening is a screw 19 having a slotted stem 20 (Fig. 3) may be more or less screwed into said opening.

The air machine may be preferably of the type shown in Fig. 5, being specially adapted to actuate the engraving tool by means of air pulses. This machine comprises a base 21 supporting an electric motor 22, the shaft 23 of which drives, through an eccentric or crank assembly 24, the crank rod 25 of a diaphragm pump 26 arranged in a socket of the base.

The embodiment according to Fig. 4 aims at simplifying the construction of the tool, making the same more sturdy and safer and at the same time more powerful in operation, as well as reducing the cost.

1. is the metal cylinder with its protecting threaded tip 2, in which the engraving needle 3 is slidably guided and adapted to reciprocate. The upper end of the cylinder 1 is screwed into the bottom of the metal cup 27 and the latter is closed by its cover 28, these two parts forming the tool head. The inner space of said head constitutes a chamber 29 receiving the members by means of which the engraving needle is actuated by percussion under the control of compressed air pulses, the tightness of said chamber being secured by means of a plastic packing 30 and a packing gland 31. This head is also provided with the threaded opening 15, partly closed by the screw 19 with slotted stem 20, in order to adjust the amount of air passing therethrough, and said head is also provided with openings 16 through the walls of the cup 27 and the cylinder 1 for preventing any back-pressure acting on the piston 32 due to air contained in the chamber and the handle.

The member operated by pulses of compressed air and, in turn, effecting the drive by percussion is simply constituted by a sturdy free piston 32 sliding in the chamber 29 and provided with circular slots, or grooves 33, for limiting the air losses, a cushioning and returning spring 34 being inserted between the upper face of said piston 32 and the cover 28. The engraving needle 3 is driven through the medium of an independent rod 35 and sleeve 36 in the cylinder 1 between the piston and the upper port or head 35 of the engraving needle 3. Said head 36 is adapted to be reciprocated in a socket 37 provided in the tip 2, the height of which limits the stroke of said head. A spring 38 constantly urges rearwardly the head 35 of the needle 3 so as to bring it into contact with the rod 35, which is thus itself brought back towards the piston 32. The stroke of the piston 32 may be adjusted by screwing more or less the cylinder 1 in the cup bottom 27, the adjusted position thus obtained being secured by means of a lock nut 39.

The operation of this improved engraving tool is substantially the same as that of the construction shown in Figs. 1 to 3. At each puff or pulse of compressed air arriving from the air machine, the hammer-piston 32 strikes the end of the independent rod 35 protruding into the cup 27. Said stem, in turn, strikes the head 36 of the engraving needle 3, which is then projected from the tip 2, this forward motion being limited by the play of the head 35 in its socket 37. The backward or return motion is effected by the return spring 38, while the spring 34 serves as a cushioning member for damping the impact of the piston 32 against the cover 28 and as a rebound member for returning said piston.

Variations, improvements or additions as well as the use of equivalent means may obviously be embodied in the foregoing structural details without departing from the spirit of the invention.

1. An engraving hand tool comprising an air container forming the head of the tool and having at one end an air inlet adapted to receive air pulses, a percussive member extending throughout the whole transversal area of said container and adapted to be imparted a vibrating motion along the axis of said container by said pulses acting on that side of said member nearest to said end of container having the air inlet, a cylinder extending from said container, said cylinder having a bore therein communicating with the side of said member remote from said air inlet end, said cylinder forming a handle adapted to be held pencil-like in the fingers of the operator, a rod slidably mounted in said cylinder bore and having one end thereof protruding into said container and in the other end protruding into said container by said pulses acting on that side of said member nearest to said end of container having the air inlet, said cylinder being adapted to effect point engraving under the action of said impacts transmitted thereto through the medium of said rod, stop means on said cylinder, a second stop means on the needle cooperating with said first stop means whereby the projection of said needle from the cylinder is limited, and spring means for returning said percussive member to a normal intermediate position in said container and for damping the motion of the percussive member at each end of its stroke.

2. An engraving hand tool comprising an air container forming the head of the tool and having at one end an air inlet adapted to receive air pulses, said container consisting of a cup-shaped body part and a hood-shaped cover part held together with their edges in abutting relation by a threaded clamping sleeve screwed on one of said parts and having a flange engaging with the other part, a percussive member extending throughout the whole transversal area of said container and adapted to be imparted a vibrating motion along the axis of said container by said pulses acting on that side of said member nearest to the air inlet end of said container, said percussive member comprising a flexible diaphragm peripherally clamped between the two parts of said container, weights secured to the center portions and on either side of said diaphragm, a cylinder co-axial with said container, one end of said cylinder communicating with that end of the container opposite to the air inlet end, said cylinder forming a handle adapted to be held pencil-like in the fingers of the operator, a rod co-axially guided in said cylinder and having one end protruding into said container to a point within impact range of said vibrating percussive member, an engraving needle slidably mounted in said container and for returning said percussive member to a normal intermediate position in said container and for damping the motion of the percussive member at each end of its stroke.
damping the motion of the percussive member at each end of its stroke.

3. An engraving hand tool comprising an air container forming the head of the tool and having at one end an air inlet adapted to receive air pulses, a percussive member extending throughout the whole transversal area of said container and adapted to be imparted a vibrating motion along the axis of said container by said pulses acting on that side of said member nearest to said air inlet of container, said percussive member comprising a free piston acting as a hammer and adapted to slide in said container, said piston being provided with peripheral grooves for limiting the air losses, a cylinder co-axial with said container, said cylinder having a bore therein communicating with the end of said container remote from the air inlet end, said cylinder forming a handle adapted to be held pencil-like in the fingers of the operator, a rod co-axially guided in said cylinder bore with one end thereof protruding into said container to a point within impact range of said vibrating percussive member, said cylinder being adapted to effect point engraving under the action of said impacts transmitted thereto through the medium of said rod, stop means on the needle, a second stop on said cylinder co-operating with said first stop means whereby the projection of said needle from the cylinder is limited, and spring means for returning said percussive member to a normal intermediate position in said container and for damping the motion of the percussive member at each end of its stroke.

4. An engraving hand tool comprising an air container forming the head of the tool and having at one end an air inlet adapted to receive air pulses, a percussive member extending throughout the whole transversal area of said container and adapted to be imparted a vibrating motion along the axis of said container by said pulses acting on that side of said member nearest to said air inlet of container, said percussive member comprising a free piston acting as a hammer and adapted to slide in said container, said piston being provided with peripheral grooves for limiting the air losses, a hollow cylinder co-axial with said container, said cylinder hollow communicating with that end of the container opposite to the air inlet end, said cylinder forming a handle adapted to be held pencil-like in the fingers of the operator, a rod co-axially guided in the hollow of said cylinder with one end thereof protruding into said container to a point within impact range of said vibrating percussive member, an extension carried by said cylinder, an engraving needle slidably mounted in said extension and protruding therefrom, said extension being provided with a socket and said needle being provided with an enlarged head portion movable in said socket under the action of said rod to effect point engraving, the height of said socket limiting the stroke of said engraving needle, and spring means for returning said percussive member to a normal intermediate position in said container and for damping the motion of the percussive member at each end of its stroke.

5. An engraving hand tool comprising an air container forming the head of the tool and having at one end an air inlet adapted to receive air pulses, said container having an adjustable air leak opening, a percussive member extending throughout the whole transversal area of said container and adapted to be imparted a vibrating motion along the axis of said container by said pulses acting on that side of said member nearest to said air inlet of container having the air inlet, a cylinder co-axial with said container, said cylinder having a bore therein communicating with the end of said container remote from the air inlet end, said cylinder forming a handle adapted to be held pencil-like in the fingers of the operator, a rod co-axially guided in said cylinder and having one end protruding into said container to a point within the range of said vibrating percussive member, an engraving needle slidably mounted in and protruding from the end of said cylinder remote from the head, said needle being adapted to effect point engraving under the action of said impacts transmitted thereto through the medium of said rod, stop means on the needle, a second stop on said cylinder co-operating with said first stop means whereby the projection of said needle from the cylinder is limited, and spring means for returning said percussive member to a normal intermediate position in said container and for damping the motion of the percussive member at each end of its stroke.

6. An engraving hand tool comprising an air container forming the head of the tool and having at one end an air inlet adapted to receive air pulses, a percussive member extending throughout the whole transversal area of said container and adapted to be imparted a vibrating motion along the axis of said container by said pulses acting on that side of said member nearest to said air inlet end of container, said percussive member comprising a free piston acting as a hammer and adapted to slide in said container, said piston being provided with peripheral grooves for limiting the air losses, a cylinder co-axial with said container, said cylinder having a bore therein communicating with the end of said container remote from the air inlet end, said cylinder forming a handle adapted to be held pencil-like in the fingers of the operator, a rod co-axially guided in said cylinder with one end thereof protruding into said container, to a point within the range of said vibrating percussive member, an engraving needle slidably mounted and protruding from the end of said cylinder remote from the head, said needle being adapted to effect point engraving under the action of said impacts transmitted thereto through the medium of said rod, stop means on the needle, a second stop on the cylinder co-operating with said first stop means whereby the projection of said needle from the cylinder is limited, and spring means for returning said percussive member to a normal intermediate position in said container and for damping the motion of the percussive member at each end of its stroke, said spring means including a compression spring inserted between the air inlet end of said container and the side of the percussive piston acted upon by the air pulses.

7. An engraving hand tool comprising an air container forming the head of the tool and having at one end an air inlet adapted to receive air pulses, a percussive member extending throughout the whole transversal area of said container and adapted to be imparted a vibrating motion along the axis of said container by said pulses acting on that side of said member nearest to said air inlet end of container, said percussive member comprising a free piston acting as a hammer...
mer and adapted to slide in said container, said piston being provided with peripheral grooves for limiting the air losses, a cylinder co-axial with said container, said cylinder having a bore therein communicating with the end of said container remote from the air inlet end, said cylinder forming a handle adapted to be held pencil-like in the fingers of the operator, a rod co-axially guided in said cylinder and having one end thereof protruding into said container to a point within the range of said vibrating percussive member, an extension carried by said cylinder, an engraving needle slidably mounted in said extension and protruding therefrom, said extension being provided with a socket and said needle being provided with an enlarged head portion movable in said socket under the action of said rod to effect point engraving, the height of said socket limiting the stroke of said engraving needle, and spring means for returning said percussive member to a normal intermediate position in said container and for damping the motion of the percussive member at each end of its stroke, said spring means including a compression spring inserted between the air end of said container and the side of the percussive piston acted upon by the air pulses and also including another compression spring inserted in the extension part socket under the head portion of the engraving needle.

8. An engraving hand tool comprising an air container forming the head of the tool and having at one end an air inlet adapted to receive air pulses, a percussive member extending throughout the whole transverse area of said container and adapted to be imparted a vibrating motion along the axis of said container by said pulses acting on that side of said member nearest to said end of container having the air inlet, a bored cylinder co-axial with said container, said cylinder being adjustably connected to said container by means of a screw-threaded connection and a lock nut and forming a handle adapted to be held pencil-like in the fingers of the operator, a rod co-axially guided in said cylinder bore, and having one end thereof protruding into said container, to a point within the range of said vibrating percussive member, an engraving needle slidably mounted in and protruding from the end of said cylinder remote from said head, said needle being adapted to effect point engraving under the action of said impacts transmitted thereto through the medium of said rod, stop means for limiting the projection of said needle from the cylinder, and spring means for returning said percussive member to a normal intermediate position in said container and for damping the motion of the percussive member at each end of its stroke.

9. An engraving tool comprising a relatively large air cylinder, a percussive member mounted for back and forth movement within the cylinder and dividing the cylinder into two compartments, a relatively small tubular member extending from said air cylinder, said tubular member having a bore therein communicating with one of said compartments, an axially reciprocable rod mounted in said bore and having one end thereof projecting into said container to a point within impact range of said percussive member, and an engraving needle operatively associated with the other end of said rod.

10. An engraving tool as defined in claim 9 in which a compression spring normally urges said rod and associated needle toward said percussive member.

11. An engraving tool according to claim 9 in which a compression spring normally urges said rod and associated needle toward said percussive member, and in which an adjustable air inlet control valve provides communication between the atmosphere and the compartment on the remote side of said percussive member from said rod, said inlet valve including a longitudinally slotted stem threadably secured in a bore leading from said remote compartment.

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