May 26, 1931. L. H. MESKER 1,806,696

TOOL LIFTER

Filed Nov. 1, 1930 2 Sheets-Sheet 1

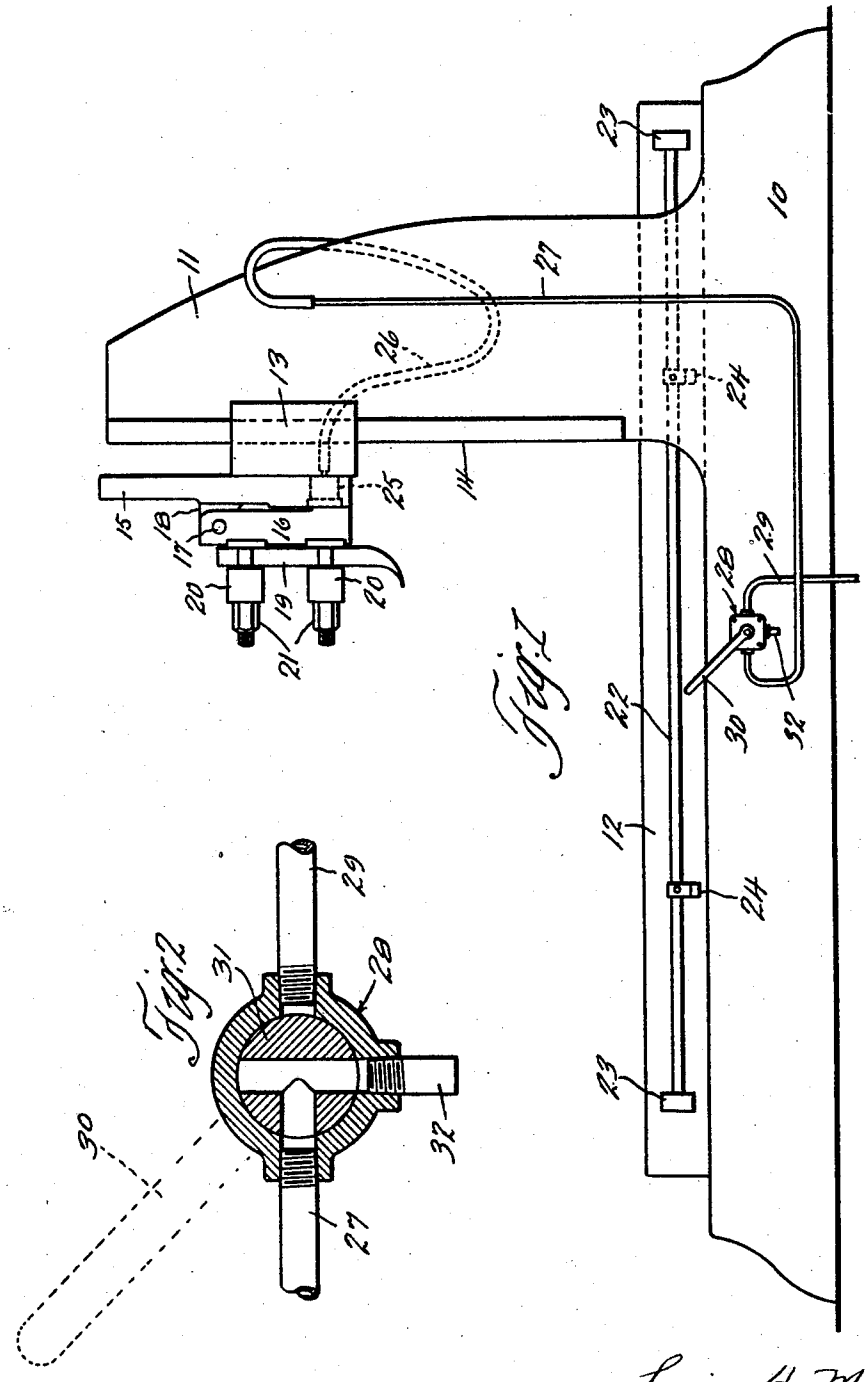


Fig. 1

Fig. 2

Inventor

Louis H. Mesker

By Hull Brockwest

Attorney

May 26, 1931. L. H. MESKER 1,806,696

TOOL LIFTER

Filed Nov. 1, 1930 2 Sheets-Sheet 2

Fig. 3

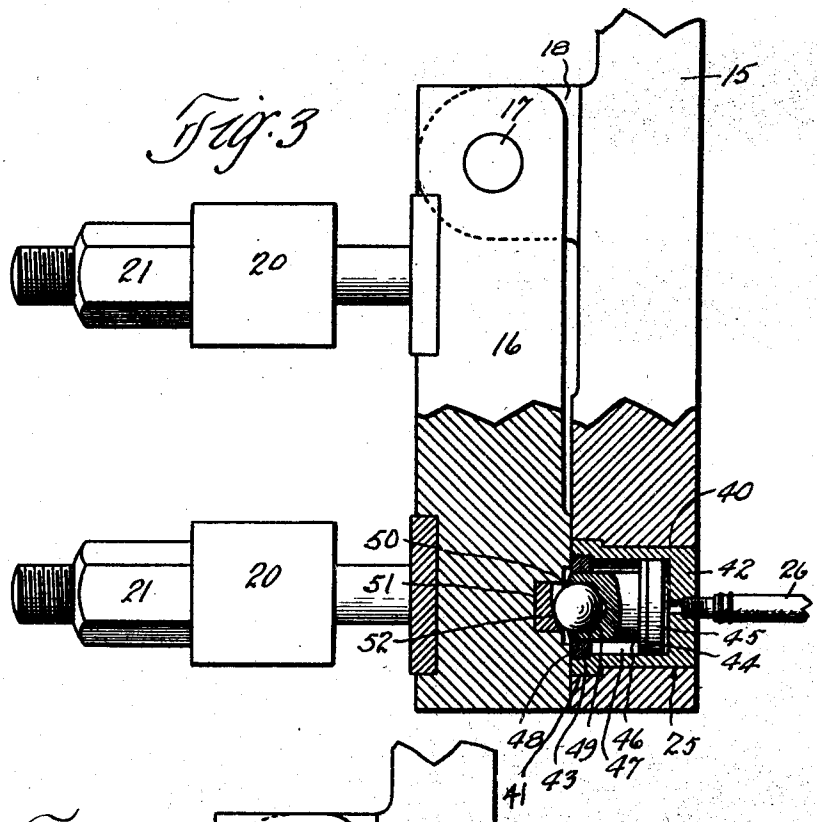
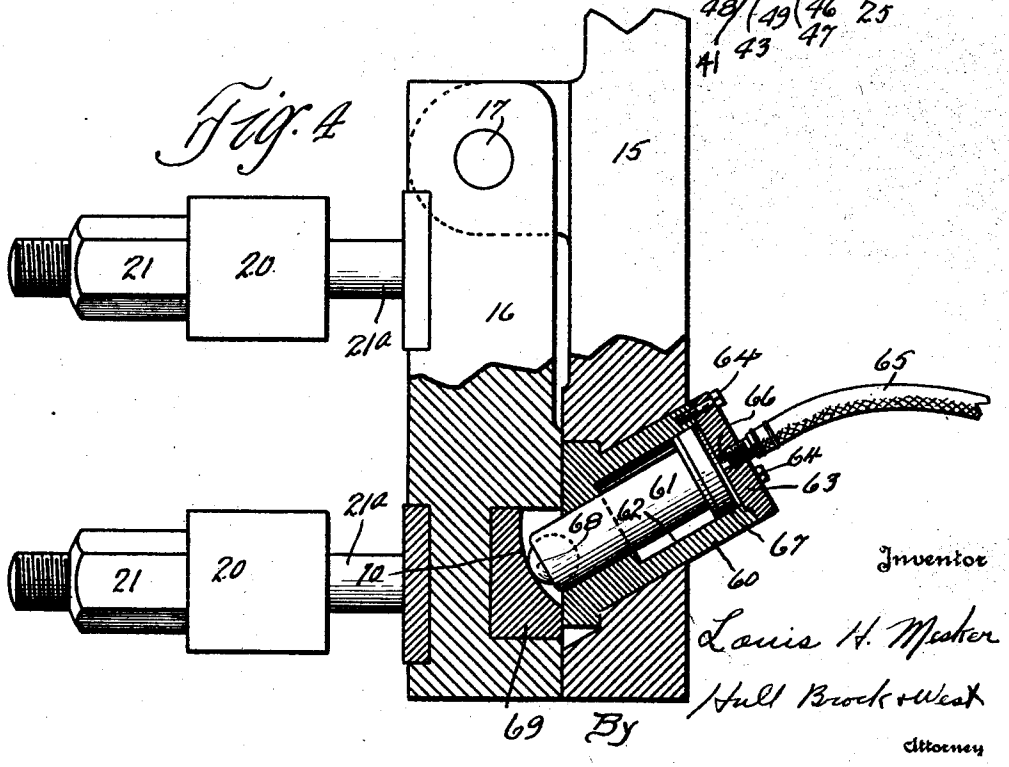


Fig. 4



Inventor

Louis H. Mesker

Hull Brock & West

By

Attorney

Patented May 26, 1931 1,806,696

UNITED STATES PATENT OFFICE

LOUIS H. MESKER, OF SHAKER HEIGHTS, OHIO, ASSIGNOR TO THE CLEVELAND PLANER COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO

TOOL LIFTER

Application filed November 1, 1930. Serial No. 492,717.

This invention relates to a tool lifter adapted to be incorporated in a metal planer or analogous device. In the operation of a planer, it is desirable that the tool should be elevated on the return or non-cutting stroke to avoid dragging the same over the metal and causing dulling thereof. I am aware that prior to my invention, devices have been proposed for effecting this general function and I therefore do not claim a tool lifter broadly. So far as I am aware, however, no tool lifter has been devised which is at the same time thoroughly efficient and sufficiently simple in construction to warrant its general use.

Accordingly, it is the general object of my invention to provide a tool lifter, operated by compressed air, which shall be simple in construction and thoroughly efficient in its function and which shall be capable of being manufactured at a minimum cost.

A more specific object is to design a device of this character which shall occupy the smallest possible space consistent with its most efficient function.

A further and closely related object is to reduce friction to the greatest possible extent and to eliminate side strains on the piston guide rod.

A still further object is to provide a means for cushioning the final portion of the tool lifting stroke of the piston to avoid too rapid motion thereof and shock at the end of the stroke.

A further object is to provide a means of attachment of the piston and cylinder unit to the clapper box in such a way that it will always tend to remain in firmly fixed position and to accomplish this result without the use of bolts or threads. Other and more limited objects of the invention will become apparent as the description proceeds.

Fig. 1 is a diagrammatic elevation illustrating the application of my improved tool lifting device; Fig. 2 is a detail of a valve which I employ; Fig. 3 is a fragmentary vertical sectional view of the preferred embodiment of my invention; and Fig. 4 is a corresponding view of a modified form.

In Fig. 1 I have shown a more or less conventional type of open side planer including a base 10 and an upright member 11, a reciprocating carriage 12, a rail 13 vertically movable on a rail guide 14, a clapper box 15 horizontally movable along the rail 13, a clapper block 16 pivoted at 17 on a projection 18 of the clapper box 15 and carrying a tool 19 secured thereto by tool clamps 20 and nuts 21. Carried by the reciprocating bed 12 is a rod 22 mounted in brackets 23 and carrying lugs 24 which are adjustably secured thereon by means of set screws. Secured in the clapper box 15 is a cylinder indicated generally by the numeral 25 and connected by means of a flexible conduit 26 to a pipe 27 which is connected through a valve indicated generally by the numeral 28 to a source of compressed air 29.

It will be understood that the control lever 30 of the valve 28 will be contacted by the lugs 24 to control the tool lifter, and that said lugs 24 will be positioned in accordance with the stroke of the planer bed to operate the valve 28 at the desired point in the motion of such bed. When the pressure is released by the valve 28, to allow the tool to return to cutting position, the air from the cylinder is allowed to exhaust through the conduit 26, pipe 27, valve rotor 31 to the exhaust pipe 32.

In the preferred embodiment of my invention, best illustrated in Fig. 3, I prefer to provide in the clapper box 15 a bore 40 provided with a counterbored portion 41 at the end thereof adjacent the clapper block 16. The cylinder 25 is designed to fit exactly within the bore 40, 41 and to completely fill the same, although it is to be understood that the cylinder may project somewhat beyond the edge of the clapper box to the right as seen in Fig. 3 or may lack some distance of extending to said edge. The cylinder 25 is provided with a head or end wall 42 and is internally threaded for a short distance as seen at 43.

A piston is provided in the cylinder 25 and may comprise a collar member 44 and a Vim leather cup 45. These members are secured to a guide rod 46 which is preferably constructed of nickel steel and is of a diameter

substantially less than the internal diameter of the cylinder 25 whereby a space 47 is provided. A guide ring 48 is threadel into the portion 43 of the cylinder 25 and has a snug fit with the guide rod 46. The guide rod 46 includes a hardened steel ball 49 which is held therein by a slightly overhanging portion 50 of the rod. By the term "guide rod" is to be understood the portion 46 and the bearing ball 49 which is rotatably carried at the end thereof.

In the clapper block 16, I mount a hardened steel bearing plate 51 which is provided with a curved surface 52 adapted to be engaged by the ball 49. The surface 52 is so designed that the ball 49 will contact the same in all the relative positions of the clapper box and clapper block with the outermost portion of the ball 49 tangent to the curved surface 52 whereby the force exerted on the guide rod and piston will always be applied directly at the axis of such guide rod and in the direction of said axis. It will be understood that the curvature of the surface 52 can be calculated abstractly by the use of the calculus or can be worked out to a sufficient approximation by methods of descriptive geometry by anyone skilled in the art. In the design of this device, after the curvature 52 is determined, the size of the ball 49 will be so selected that the curvature of the ball is always greater than that of the curve whereby proper tangency will always result. No attempt has been made to plot the curve 52 accurately in the accompanying drawings.

In the modification illustrated in Fig. 4, I have shown the cylinder 60 positioned at an angle to the contacting faces of the clapper box and clapper block whereby the guide rod 61 is directed downwardly at an angle. While this construction is not essential, it may nevertheless be preferable in certain installations, even though somewhat more difficult and expensive to manufacture. One object of this angular position is to provide a longer stroke for the purpose of increasing the cushioning effect of the space 62 without changing the piston size. It will be understood that in both forms these cushioning spaces (47—62) operate by the dash pot principle to cushion the final portion of the stroke, it being possible for air to escape very slowly around the guide rod. The device may be designed so that this escape of air need not be considerable by providing the stroke of the piston such that it need not move more than a part of the length of the air space. Such a construction is rendered easier by the use of the modification of Fig. 4. In this form of my invention I also secure a considerable mechanical advantage by the relative distance moved by the piston to that moved by the clapper block. In this modification, the cylinder 60 is inserted in a manner similar to cylinder 25, but the head 63 is secured to the outer end of the cylinder by suitable bolts 64. A flexible conduit 65 is provided which communicates with the interior of the cylinder through a bore 66 in the head 63. A similar piston 67 is provided and an anti-friction ball 68 is secured at the end of the guide rod 61. A bearing member 69 is secured in a depression in the clapper block 16 and is provided with a curved surface 70 designed to secure corresponding results to those described in connection with surface 52. In this case, the problem of designing the curved surface 70 will be somewhat different but not considerably more difficult and can be worked out by the same general principles.

From the foregoing, it will be evident that I have provided an improved tool lifter which is well adapted for its intended purpose and while I have illustrated certain preferred embodiments, of my invention, I wish it understood that the same is not limited to those modifications shown but is susceptible of incorporation in other forms within the scope of the appended claims.

Having thus described my invention, what I claim is:—

1. In a device of the type described, a clapper-box member, a clapper-block member pivoted thereto, a cylinder formed in one of said members, a piston in said cylinder, a rod connected to said cylinder and projecting out of same and engaging said other member, a bearing surface formed on said other member to be contacted by said rod for moving said pivoted member about its pivot point, said surface being so curved that the axis of said rod is always perpendicular thereto at its point of intersection therewith.

2. In a device of the type described, a clapper-box member, a clapper-block member pivoted thereto, a cylinder formed in one of said members, a piston in said cylinder, a rod connected to said cylinder and projecting out of same and engaging said other member, said rod having an anti-friction ball revolubly and centrally mounted in the outer end thereof, a bearing surface formed on said other member to be contacted by said ball for moving said pivoted member about its pivot point, said surface being so curved that the axis of said rod is always perpendicular thereto at its point of intersection therewith.

3. In a device of the type described, a clapper-box member, a clapper-block member pivoted thereto, a cylinder formed in one of said members, a piston in said cylinder, a rod connected to said cylinder and projecting out of same and engaging said other member, said rod having an anti-friction ball revolubly and centrally mounted in the outer end thereof, a bearing surface formed on said other member to be contacted by said ball for moving said pivoted member about its

pivot point, said surface being so curved that the axis of said rod is always perpendicular thereto at its point of intersection therewith, the degree of curvature of said ball being greater than that of said curved bearing surface at any point whereby said ball is always tangent to said surface at the outermost point on said ball and at the point of intersection of the axis of said rod with said surfaces.

4. In a device of the type described, a clapper-box member, a clapper-block member pivoted thereto, a cylinder formed in one of said members, a piston in said cylinder, a rod connected to said cylinder and projecting out of same and engaging said other member, a bearing surface formed on said other member to be contacted by said rod for moving said pivoted member about its pivot point, said surface being so curved that the axis of said rod is always perpendicular thereto at its point of intersection therewith, said cylinder and rod being disposed at an acute angle to the front face of said clapper-box.

5. In a device of the type described, a clapper-box member, a clapper-block member pivoted thereto, a cylinder formed in one of said members, a piston in said cylinder, a rod connected to said cylinder and projecting out of same and engaging said other member, said rod having an anti-friction ball revolubly and centrally mounted in the outer end thereof, a bearing surface formed on said other member to be contacted by said ball for moving said pivoted member about its pivot point, said surface being so curved that the axis of said rod is always perpendicular thereto at its point of intersection therewith, said cylinder and rod being disposed at an acute angle to the front face of said clapper-box.

6. In a device of the type described, a clapper-box member, a clapper-block member pivoted thereto, a cylinder formed in one of said members, a piston in said cylinder, a rod connected to said cylinder and projecting out of same and engaging said other member, said rod having an anti-friction ball revolubly and centrally mounted in the outer end thereof, a bearing surface formed on said other member to be contacted by said ball for moving said pivoted member about its pivot point, said surface being so curved that the axis of said rod is always perpendicular thereto at its point of intersection therewith, the degree of curvature of said ball being greater than that of said curved bearing surface at any point whereby said ball is always tangent to said surface at the outermost point on said ball and at the point of intersection of the axis of said rod with said surfaces, said cylinder and rod being disposed at an acute angle to the front face of said clapper-box.

7. In a device of the class described, a vertically extending clapper-box, a clapper-block extending parallel to and pivoted upon a projection of said clapper-box, a bore extending into said clapper-box below said projection, said bore being counterbored on the end adjacent said clapper-block whereby a shoulder is formed, a cylinder filling said bore and having a wall closing the end thereof remote from said clapper-block, a piston in said cylinder, a guide rod attached to said piston and extending toward and contacting said clapper-block, said guide rod including an anti-friction ball mounted for rotation in the end thereof and adapted to contact said clapper-block for moving the same to lift a tool, said cylinder being internally threaded for a short distance at the end adjacent said clapper-box and an externally threaded guide ring received in said cylinder and having a snug fit with said guide rod, said cylinder being provided with a passage adapted to be connected to a source of compressed air.

8. In a device of the class described, a clapper-box, a clapper-block extending parallel to and pivoted upon said clapper-box, a bore extending into said clapper-box, a cylinder in said bore and having a wall closing the end thereof remote from said clapper-block, a piston in said cylinder, a guide rod attached to said piston and extending toward and contacting said clapper-block, said guide rod including an anti-friction ball mounted for rotation in the end thereof and adapted to contact said clapper-block for moving the same to lift a tool, a guide ring received in said cylinder and having a snug fit with said guide rod, said cylinder being provided with a passage adapted to be connected to a source of compressed air.

9. In a device of the class described, a vertically extending clapper-box, a clapper-block extending parallel to and pivoted upon a projection of said clapper-box, a bore extending into said clapper-box below said projection, said bore being counterbored on the end adjacent said clapper-block whereby a shoulder is formed, a cylinder filling said bore and having a wall closing the end thereof remote from said clapper-block, a piston in said cylinder, a guide rod attached to said piston and extending toward and contacting said clapper-block, said guide rod including an anti-friction ball mounted for rotation in the end thereof and adapted to contact said clapper-block for moving the same to lift a tool, said cylinder being internally threaded for a short distance at the end adjacent said clapper-block and an externally threaded guide ring received in said cylinder and having a snug fit with said guide rod, said cylinder being provided with a passage adapted to be connected to a source of compressed air, said clapper block being provided with a bearing adapted to be contacted by said ball,

said bearing presenting for contact with said ball a surface so curved that said ball is always tangent to the surface at a point coinciding with the intersection of the axis of said rod with said surface.

10. In a device of the class described, a clapper-box, a clapper-block extending parallel to and pivoted upon said clapper-box, a bore extending into said clapper-box, a cylinder in said bore and having a wall closing the end thereof remote from said clapper-block, a piston in said cylinder, a guide rod attached to said piston and extending toward and contacting said clapper-block, said guide rod including an anti-friction ball mounted for rotation in the end thereof and adapted to contact said clapper-block for moving the same to lift a tool, a guide ring received in said cylinder and having a snug fit with said guide rod, said cylinder being provided with a passage adapted to be connected to a source of compressed air, said clapper-block being provided with a bearing adapted to be contacted by said ball, said bearing presenting for contact with said ball a surface so curved that said ball is always tangent to the surface at a point coinciding with the intersection of the axis of said rod with said surface.

11. In a device of the class described, a vertically extending clapper-box, a clapper-block extending parallel to and pivoted upon a projection of said clapper-box, a bore extending into said clapper-box below said projection, said bore being counterbored on the end adjacent said clapper-block whereby a shoulder is formed, a cylinder filling said bore and having a wall closing the end thereof remote from said clapper-block, a piston in said cylinder, a guide rod attached to said piston and extending toward and contacting said clapper-block, said guide rod including an anti-friction ball mounted for rotation in the end thereof and adapted to contact said clapper-block for moving the same to lift a tool, said cylinder being internally threaded for a short distance at the end adjacent said clapper-block and an externally threaded guide ring received in said cylinder and having a snug fit with said guide rod, said cylinder being provided with a passage adapted to be connected to a source of compressed air, said guide rod being of a diameter substantially smaller than the internal diameter of said cylinder.

12. In a device of the class described, a clapper-box, a clapper-block extending parallel to and pivoted upon said clapper-box, a bore extending into said clapper-box, a cylinder in said bore and having a wall closing the end thereof remote from said clapper block, a piston in said cylinder, a guide rod attached to said piston and extending toward and contacting said clapper-block, said guide rod including an anti-friction ball mounted for rotation in the end thereof and adapted to contact said clapper-block for moving the same to lift a tool, a guide ring received in said cylinder and having a snug fit with said guide rod, said cylinder being provided with a passage adapted to be connected to a source of compressed air, said guide rod being of a diameter substantially smaller than the internal diameter of said cylinder.

In testimony whereof, I hereunto affix my signature.

LOUIS H. MESKER.