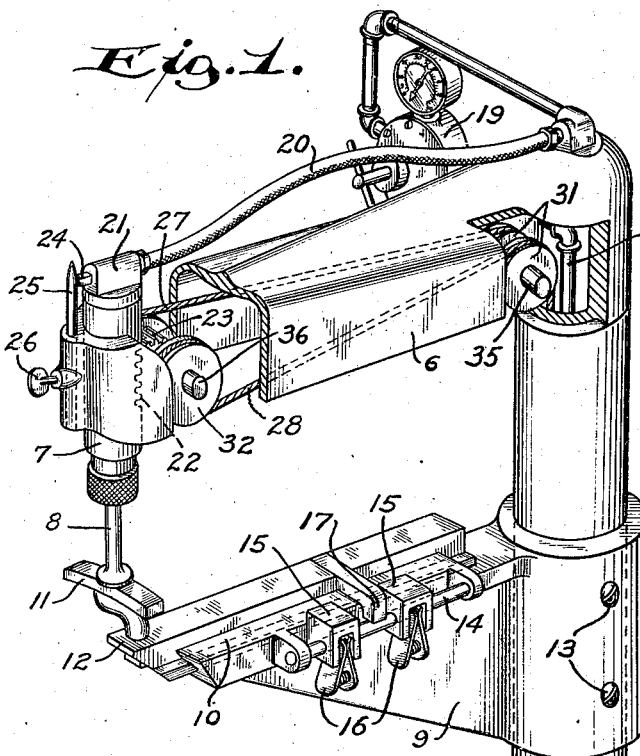
Feb. 19, 1946. W. K. BECKWITH 2,395,366

PLANISHING MACHINE

Filed Nov. 27, 1943

Fig. 1.



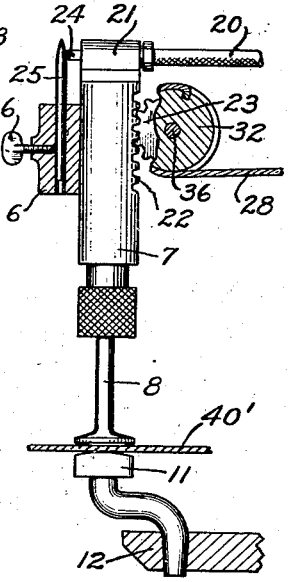


Fig. 2.

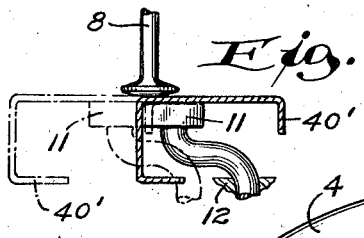


Fig. 3.

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PLANISHING MACHINE

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9 Claims. (Cl. 153—32)

The present invention relates in general to improvements in the art of smoothing sheet metal by lightly hammering the same, and relates more specifically to various improvements in the construction and operation of planishing machines.

The primary object of my invention is to provide an improved planishing mechanism for sheet metal or the like, which is simple in construction and highly effective in use.

In the airplane manufacturing industry, it is necessary to utilize considerable relatively light sheet metal for the construction of various parts, and it is also extremely desirable to have the surfaces of this sheet metal as smooth and free from irregularities, as possible. Since no suitable mechanical means or mechanism for properly smoothing or planishing such thin sheet material, was heretofore available, it has long been common practice to manually hammer the sheets to proper smoothness, and this procedure besides being very tedious and costly, frequently did not result in a desirably smooth finished product and often resulted in waste of valuable sheet stock. Then too, it requires a high degree of skill and special adaptation, for a workman to be able to planish such sheets by hand and with the aid of a hammer or mallet; and since large quantities of sheet metal are required and must be planished, and only a limited number of individuals for doing this class of work are available, the manufacture of airplanes has heretofore been seriously hampered and delayed.

It is therefore a more specific object of the present invention to provide a new and useful planishing machine which greatly facilitates the work of smoothing relatively thin sheet metal or the like and reduces the skill and dexterity necessary for this type of work thereby enhancing the production of airplanes and the like.

Another specific object of this invention is to provide improved mechanism for enabling relatively unskilled workmen to quickly and effectively planish sheet metal parts of diverse shapes and sizes, while eliminating waste of stock.

A further specific object of my invention is to provide simple and durable metal planishing equipment which can be conveniently operated or manipulated while the operator is seated, and which may also be manufactured at moderate cost and is highly flexible in its adaptations.

These and other specific objects and advantages of the invention will be apparent from the following detailed description.

A clear conception of the several features constituting the present improvement, and of the mode of constructing and of manipulating planishing machines embodying the invention, may be had by referring to the drawing accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a part sectional perspective view of my improved sheet metal planisher, portions thereof having been broken away in order to more clearly reveal normally concealed parts;

Fig. 2 is a relatively diagrammatic fragmentary section taken through the working zone of the machine; and

Fig. 3 is a view showing the application of the machine to flanged work.

While the invention has been shown and described herein as having been embodied in a pedestal type of normally stationary planisher having a pneumatically actuated hammer and being especially adapted to iron or straighten sheet metal parts of diverse shapes, it is not my desire or intent to thereby unnecessarily restrict the scope or utility of the improved features.

Referring to the drawing, the improved planishing machine shown therein comprises in general a normally fixed frame or support having a base 4, a hollow upright column 5 secured to and rising from the base 4, and an upper arm or bracket 6 secured to the top of the column 5 and providing a support for a vertically adjustable pneumatic hammer 7 which has a reciprocable impact element 8 operable in the working zone of the machine; a lower support 9 reaching outwardly from the frame column 5 beneath the bracket 6 and having rectilinear guides 10 thereon; an anvil 11 with which the impact element 8 of the hammer 7 is cooperable at the working zone and which is carried by a slide 12 freely movable along the guides 10; and mechanism mounted upon the frame for effecting convenient foot control and actuation of the hammer 7.

The normally fixed or stationary frame comprising the base 4, column 5, and bracket 6 may be of any desired size and shape depending upon the type of work to be performed by the machine, but should be of sturdy construction with the several parts formed hollow for proper concealment and protection of internal structure and mechanisms. The hammer 7 which actuates the impact element 8, may also be of any desired construction, and as shown, this hammer is of the pneumatic type having a vertically adjustable cylinder within which a piston is rapidly reciprocable by air under pressure so as to impart impulses to the impact element 8, in a well known

manner. The impact element 8 which is preferably removably associated with the hammer 7, may also be of varied formation dependent upon the work to be performed, and the same is true of the anvil 11 which coacts with the hammer element 8 through the intervening sheet metal being straightened. The lower support 9 upon which the anvil 11 is slidable in an approximately horizontal direction and laterally of the axis of reciprocation of the hammer piston and element 8, may be made adjustable along the column 5 in any suitable manner as by clamping screws 13; and the slide 12 which detachably supports the anvil 11, should be freely slidable along the guideway formed by the guides 10 toward and away from the working zone. In order to limit this sliding motion of the slide 12, the lower support 9 is provided with a side rod 14 disposed parallel to the guides 10 and having thereon adjustable stop blocks 15 provided with locking clamps 16, and the slide 12 has an integral finger or projection 17 which is movable along the rod 14 between the adjustable limit blocks 15.

As shown, the pneumatic hammer 7 may be supplied with air under pressure from a supply pipe 18 extending upwardly through the hollow frame column 5, to a manually controllable pressure regulator 19 and from thence through a flexible connection 20 to a control valve 21 carried by the vertically adjustable cylinder of the hammer 7. The cylinder of the hammer 7 is provided on one side with rack teeth 22 with which a rotary gear 23 is cooperable, and the hammer control valve 21 has an actuating stem 24 which is cooperable with a normally fixed but vertically adjustable wedge member 25 carried by the upper bracket 6 of the main frame. This assemblage is obviously such, that when the hammer 7 is raised from the position shown in Fig. 1, the valve stem 24 will disengage the wedge member 25 and the air admission valve 21 will close and thereby stop the operation of the hammer, but when the hammer is subsequently lowered the stem 24 will reengage the member 25 to automatically open the valve 21 and thereby place the hammer 7 in operation. In order to permit variation in the time at which such stopping and starting of the hammer operation will be effected, the wedge member 25 is vertically adjustable and may be locked in adjusted position with the aid of a thumb screw 26.

Since both of the operator's hands are normally being utilized to hold the sheet metal 40' at the working zone and between the impact element 8 and the anvil 11, and for manipulation of the pressure regulator 19, it is extremely desirable that the mechanism for raising and lowering the hammer 7 be controllable manually but without necessitating use of the hands. I have therefore provided a simple and convenient foot operable device for controlling the positioning of the hammer, and this control mechanism comprises a pair of reversely movable cables 27, 28 concealed within the frame base 4, column 5, and bracket 6, and coacting with a series of sets of sheaves 29, 30, 31, 32 carried by short shafts 33, 34, 35, 36 respectively, three of which are mounted in the adjacent parts of the frame and the other of which is mounted upon the swinging end of a cable tensioning lever 37.

Secured to the lower front shaft 33 to which the sheaves 29 are also fastened, is a foot operable roller 38 which is preferably covered with rubber surfacing for preventing slippage, and the lower front ends of the cables 27, 28 are attached to the adjacent sheaves 29 and are wrapped snugly around these two sheaves in opposite directions. The cable tensioning lever 37 is swingably suspended from a fixed pivot shaft 39, and a tension adjusting screw 40 coacts with the medial portion of the lever 37 so as to force the idler sheaves 30 which are journalled on the shaft 34 against the adjacent bends of the cables 27, 28. The upper rear sheaves 31 are also idlers or guide sheaves, and are therefore journalled for rotation upon the shaft 35, but the upper front sheaves 32 are fastened to the shaft 36 which is journalled for rotation in the bracket 6 and to which the gear 23 is also secured. The upper forward ends of the cables 27, 28 are again attached to and snugly coact with the adjacent sheaves 32 in opposite directions; and this mechanism which is concealed within the hollow frame, is obviously so constructed and arranged, that by rotating the roller 38 in one direction the cables 27, 28 will function to raise the hammer 7, whereas opposite rotation of the roller 38 will result in lowering of the hammer together with its impact element 8.

During normal operation of the improved planishing machine, the operator may be seated on a chair in front of the machine within easy reach of the pressure regulator 19 and of the working zone. Depending upon the type of work it is performing, the pressure regulator 19 should first be adjusted to the proper working pressure, and the proper type of impact element 8 and anvil 11 should be applied to the hammer 7 and slide 12 respectively. The stop blocks 15 should also be adjusted along the rod 14 by manipulation of the clamp 16, so as to provide for proper extent of movement of the slide 12 along the guides 10, and the sheet metal 40' which is to be straightened may then be inserted between the impact element 8 and the anvil 11 while the hammer 7 is raised and no air is being delivered thereto. When the air pressure has been thus properly regulated and the other adjustments have been made, the operator may manipulate the roller 38 with his foot so as to gradually lower the hammer 7 and to cause the impact element 8 to impinge against the sheet metal 40' resting upon the anvil 11. The sheet metal 40' may then be moved in any direction over the surface of the anvil 11 and this anvil with the sheet metal resting thereon together with the slide 12, may be moved bodily along the guides 10 within the limits set by the stop blocks 15 so as to straighten a considerable area of the metal disposed within the working zone, see Fig. 3.

When straightening flat sheets of metal 40' which are devoid of projections or flanges, as indicated in Fig. 2, the stop blocks 15 may be set to hold the anvil 11 stationary and in axial alinement with the impact element 8. The sliding motion of the anvil 11 is however important when straightening elongated flanged pieces of metal 40' as shown in Fig. 3. The stop blocks 15 should then be adjusted and fixed so as to limit the sliding motion of the slide 12 to an extent equal to the width of the anvil 11 which is being utilized so that the opposite edges of the anvil may be brought into vertical alinement with the axis of the element 8. The width of the various anvils 11 as well as the degree of off-set of the supporting stems, will vary in accordance with the particular shapes of the work pieces which are to be straightened, and with the anvils 11 thus permitted to shift across the work-

ing zone, the central portion of the hammer element may be caused to strike up to the very edges of the flanged pieces of metal 40'. Since these elongated flanged pieces of metal 40' are also slidable longitudinally along the anvils 11, they may obviously be straightened throughout their entire areas, and such action was not possible with prior machines having fixed anvils. These prior machines moreover could not be utilized to straighten work pieces having underslung flanges as shown in Fig. 3, because their lower and inwardly directed flanges would strike the anvil supports, and the present improved assemblage may therefore be utilized to straighten sheet metal pieces of various shapes and sizes, with greatest ease and without obstruction.

Due to the fact that the position of the hammer 7 may be varied by means of the operator's foot, his hands are free at all times for manipulation of the sheet metal 40' which is being straightened, and the hammer 7 is automatically placed into and out of operation with the aid of the foot operable roller 38. By proper adjustment of the screw 40, the tension of the cables 27, 28 may be readily adjusted, so as to insure positive and rapid movement of the hammer in either direction, and the flexible hose 20 for conducting the air from the pressure regulator 19 to the valve 21 eliminates interference with the up and down movement of the hammer 7. The operator may also be seated in front of the working zone within easy reach of all of the adjusting elements, and the anvil support 9 can be readily adjusted along the column 5 so as to accommodate operators of different sizes.

From the foregoing description it will be apparent that my present invention provides an improved planishing machine which is extremely simple, compact and durable in construction, and which is moreover highly efficient and flexible in use. The improved planisher can obviously be readily manipulated so as to greatly facilitate the planishing of sheet metal parts of various sizes and shapes, by virtue of the provision of the laterally adjustable anvil 11, and the air pressure as well as the limits of movement of the slide 12 can be quickly and readily varied as they are located within easy reach of the working zone. By virtue of the fact that the motion transmitting cables 27, 28 and the sheaves with which they coact, are all concealed within the hollow portions of the main frame, these parts are not only protected against tampering, but the operator is also protected against possible injury. The automatic actuation of the valve 21 by merely raising and lowering the hammer 7, is also a safety feature which eliminates waste of air when the hammer is not in actual use, and by adjusting the wedge member 25 the time of actual operation of the hammer 7 may be conveniently varied. The improved planishing mechanism has proven highly satisfactory and successful in actual commercial use, especially in the airplane manufacturing industry, and the assemblage can obviously be manufactured at moderate cost and is most conveniently operable to effectively perform its duty.

It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of use, herein shown and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

I claim:

1. A planishing machine comprising, a fixed frame, a pneumatic hammer bodily adjustable relative to said frame toward and away from a working zone, an anvil carried by said frame and being freely slidable transversely across the axis of said hammer, means carried by said frame for starting and stopping the operation of said hammer, and means for effecting adjustment of the hammer to cause said starting and stopping means to function.

2. A planishing machine comprising, a fixed frame, a pneumatic hammer bodily adjustable relative to said frame toward and away from a working zone, an anvil carried by said frame and being freely slidable transversely across the axis of said hammer, means carried by said frame for starting and stopping the operation of said hammer, and foot operable means confined within said frame for effecting adjustment of the hammer to cause said starting and stopping means to function.

3. A planishing machine comprising, a fixed frame, a pneumatic hammer movable vertically upon said frame toward and away from a working zone and having thereon a starting and stopping valve, an anvil carried by said frame within said zone, means carried by said frame for actuating said valve to operate the hammer when said hammer is moved vertically, and means for effecting up and down movement of said hammer relative to the frame.

4. A planishing machine comprising, a frame, a fluid pressure actuated hammer bodily movable upon said frame toward and away from a working zone and carrying a fluid control valve, an anvil carried by said frame and being movable within said zone transversely of the direction of movement of said hammer, means carried by said frame and being cooperable with said valve whenever the hammer is moved bodily to start and stop the operation of said hammer, and remote control means for moving said hammer.

5. A planishing machine comprising, a frame, a fluid pressure actuated hammer bodily movable upon said frame toward and away from a working zone and carrying a fluid control valve, an anvil carried by said frame and being movable within said zone transversely of the direction of movement of said hammer, a wedge member mounted upon said frame and being cooperable with said valve whenever the hammer is moved down and up to start and stop the operation of said hammer, and foot operable means for moving said hammer toward and away from said zone.

6. A planishing machine comprising, a frame, a fluid pressure actuated hammer bodily movable upon said frame toward and away from a working zone and carrying a fluid control valve, an anvil carried by said frame and being movable within said zone, an adjustable member mounted upon said frame and being cooperable with said valve to start the operation of said hammer when the latter is moved toward said zone, and means for positively bodily moving said hammer toward said zone.

7. A planishing machine comprising, a frame, a fluid pressure actuated hammer bodily movable upon said frame toward and away from a working zone and carrying a fluid control valve, an anvil carried by said frame and being movable within said zone, an adjustable member mounted upon said frame and being cooperable with said valve to stop the operation of said hammer when the latter is moved away from said zone, and means for positively bodily moving said hammer away from said zone.

8. A planishing machine comprising, a frame, a hammer bodily movable upon said frame toward and away from a working zone, control means carried by said hammer for starting and stopping the same, a member carried by said frame and being cooperable with said control means to start or stop the operation of said hammer whenever the latter is moved toward or away from said zone, and means for positively bodily moving said hammer in opposite directions.

9. A planishing machine comprising, a frame, a hammer bodily movable upon said frame toward and away from a working zone, control means carried by said hammer for starting and stopping the same, a member carried by said frame and being cooperable with said control means to start or stop the operation of said hammer whenever the latter is moved toward or away from said zone, means for positively bodily moving said hammer in opposite directions, and an anvil cooperable with said hammer and being freely movable within said zone transversely of the direction of movement of the hammer.

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