ABSTRACT OF THE DISCLOSURE

Apparatus making possible drilling and riveting operations to be simultaneously performed on a workpiece without holes drilled in the workpiece being deformed in any respect regardless of forces induced into the apparatus due to the riveting operation. The above is accomplished by utilizing major and minor frame structures mounted independently of each other. The major frame structure is of hollow construction and carries the riveting means. The minor frame structure constitutes an independent frame independently mounted within the major frame structure. The minor frame structure carries the drilling means. Mounted in this manner, it is obvious strain induced in the major frame structure will not be transmitted to the minor frame structure.

This invention relates to a facility for effecting a fabrication operation and more particularly to a machine adapted to simultaneously effect drilling and riveting operations on a panel assembly or the like constructed of hard metals and in which the holes drilled in the assembly are not distorted or deformed as a result of the riveting operation.

Machines for simultaneously performing a dual operation of drilling and riveting on a panel assembly or the like are well known and are presently available. However, it is also well known that drilling and riveting operations simultaneously effected the same machine, and on a panel assembly constructed of hard metal, results in an out-of-round configuration being imparted to the holes as they are drilled therein. The fabrication of panel assemblies—normally is effected on a machine having a single yoke (frame) generally of C configuration. Utilizing a machine of the above type (single yoke) results in an out-of-round or otherwise deformed condition being imparted to the holes as they are drilled due to the deflection of the single yoke occurring during the riveting (squeezing) operation. Frequently the above condition also results in broken drill bits, a condition which is time consuming and quite objectionable for obvious reasons.

The conditions described above were not objectionable and could be tolerated when aluminum and other soft metals were utilized in the fabrication of aircraft panels. However, with the advent of harder metals (titanium, beryllium, etc.) the condition became intolerable and corrective measures were required.

Accordingly it is a prime object of the present invention to disclose a machine on which drilling and riveting operations are simultaneously performed and in which the drill bit and spindle thereof are not deflected during the riveting operation.

Another object is to disclose a machine on which drilling and riveting operations are simultaneously performed embodying a separate or “floating yoke” which functions independently of the frame and yoke of the main machine.

Briefly the present invention includes a separate or “floating yoke” secured to the main frame of the machine and on which the drill bit and spindle are mounted. The main frame of the machine assumes all the forces resulting from the riveting operation leaving the “floating yoke” to absorb only forces resulting from the drilling operation which are quite small as compared to the forces resulting from a riveting (squeezing) operation. The “floating yoke” is entirely independent of deformations occurring in the main frame of the machine and is secured thereto only at such points as will not influence movement thereof in response to deflections occurring therein during a riveting (squeezing) operation or a vibrating cycle.

FIGURE 1 is a front elevational view of a machine as disclosed herein.

FIGURE 2 is a sectional view of FIGURE 1 taken on the line 2—2 of FIGURE 1.

FIGURE 3 is a reduced sectional view of FIGURE 1 taken on the line 3—3 of FIGURE 1.

Referring to the drawing, FIGURES 1 and 2 shows a machine of the type disclosed herein adapted to simultaneously perform drilling and riveting operations on a panel assembly 12 without distortion being imparted to holes drilled in the assembly. The machine 11 comprises a C shaped frame 14, hereinafter referred to as the major frame of the machine 14, of shell-like configuration. The frame is symmetrically constructed about a vertical axis A—A (FIGURE 1) and includes base, back and over head portions 16, 17 and 18, respectively. The major frame of the machine 11 is of integral construction defining a throat portion 19 in which the panel assembly 12 is positioned at such time as drilling and riveting operations are performed thereon. The integral construction of the base, back and overhead portions 16, 17 and 18, respectively, render the frame members 14 extremely firm and rigid.

The lower wall 21 of the overhead portion 18 defines a passageway 22 the function of which will become apparent as the disclosure progresses.

Positioned centrally and inside of the major frame member is a frame member 23 of solid construction, hereinafter referred to as the minor frame member. In the embodiment shown the minor frame member 23 also is symmetrically constructed about the axis A—A. The minor frame member 23 includes base, back and overhead portions 24, 26 and 27, respectively, and also a depending portion 20 all joined together in integral construction. The member 23 is shown as being of solid construction, however, this need not be the case, it may be of hollow or built-up construction if it is found more expedient and practical to construct it in this manner.

As assembled, the member 23 is positioned centrally within the member 14, in other words it is centrally positioned with respect to the axis A—A. In the embodiment shown the member 23 is symmetrically positioned with respect to the axis A—A, however, this relationship is not absolutely necessary. The prime requisite in this respect being that (relationship of members 23 and 24) the working head secured to the minor frame member 23 is positioned adjacent the working head or heads secured to the major frame of the machine 11.

Referring to FIGURE 2, it will be seen that the major and minor frame members 14 and 23, respectively, are secured together and to the foundation upon which the machine 11 rests. Referring further to this figure, it will also be seen the minor frame member 23 has the same general configuration as the major frame member 14, however, its dimension are somewhat less providing clearance therebetween as indicated generally by the numeral
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In a machine adapted to simultaneously effect drilling and riveting operations on a workpiece, comprising:

(a) major and minor frame members each including base, overhead and back portions defining throat portions;
(b) first upper and lower means mounted on said base and overhead portions of said major frame member, respectively, and at least said upper or lower means including riveting and actuating means functioning to effect a riveting operation when said actuating means is actuated;
(c) second upper and lower means mounted on said base and overhead portions of said minor frame member, respectively, and at least said second upper or lower means including actuator and drilling means functioning to effect a drilling operation when said actuating means is actuated;
(d) and said major and minor frame member being secured together so that corresponding portions there of have a juxtapositioned relation with respect to each other and so that deflections of said major frame member, resulting from a riveting operation performed thereon, will not be transmitted to said minor frame member.

In apparatus as set forth in claim 3:

(a) in which the overhead portion of said minor frame member includes a depending portion;
(b) the lower wall of said overhead portion of said major frame portion defining a passageway having a configuration corresponding to the cross-sectional configuration of said depending portion but exceeding the dimensions of said depending portion;
(c) said second upper means being mounted on said depending portion;
(d) the manner in which said major and minor frame members are secured together being further characterized in that said depending portion extends through said passageway and said base portion of said minor frame member is supported by and secured to the base portion of said major frame member.

In apparatus as set forth in claim 4:
(a) in which angular members are utilized in securing said minor frame member in said major frame member positioned adjacent the base and overhead portions of said major and minor frame members; (b) and said angular members located at the lower-most portion of said base portions being fixedly secured to the base portions of said major and minor frame members and all other angular members being fixedly secured to said major frame member and having a sliding relationship with said minor frame member.

References Cited

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