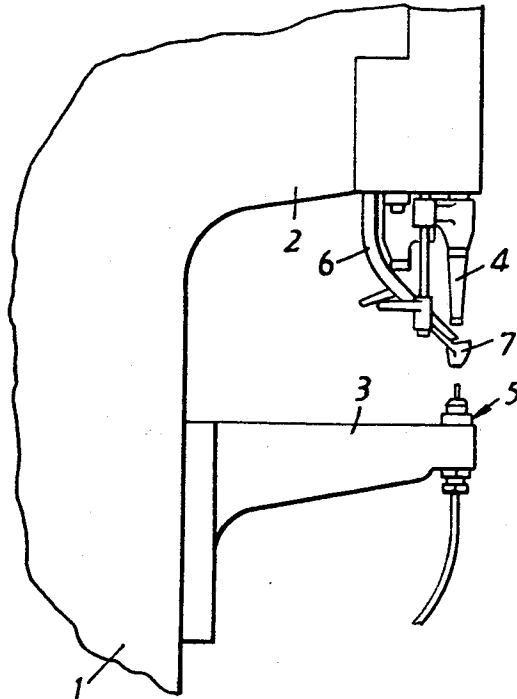


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[56] **References Cited**
UNITED STATES PATENTS
2,230,518 2/1941 Weinhold..... 227/61
2,312,554 3/1943 Jacques..... 227/62
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[54] **RIVETTING MACHINES**
2 Claims, 2 Drawing Figs.
[52] U.S. Cl..... 227/61
[51] Int. Cl..... B21j 15/10
[50] Field of Search..... 227/60, 61,
62

ABSTRACT: The anvil of a rivetting machine has a pneumatically-supported pin to locate the work being rivetted and/or to guide the rivet, the anvil pin being retractable against an adjustable but substantially uniform rate to cushion the force of the descending rivetting plunger.



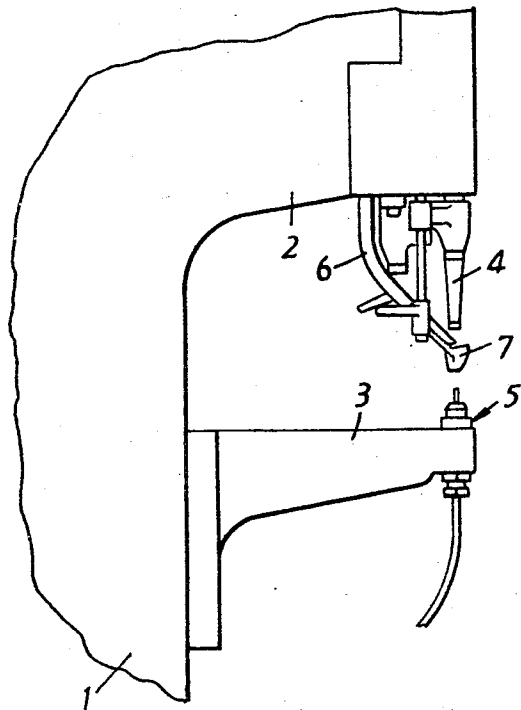
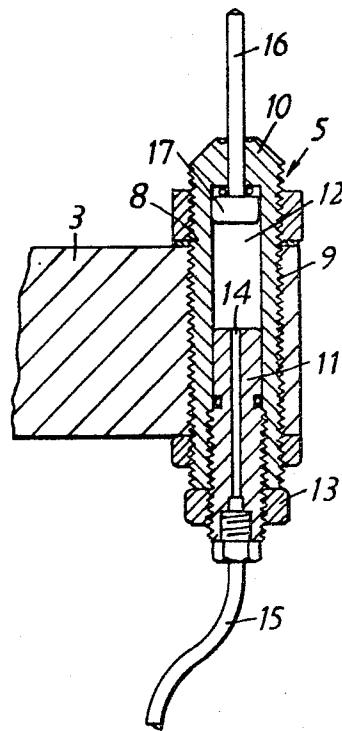


FIG. 1.

FIG. 2.



RIVETTING MACHINES

This invention relates to rivetting machines (in which term, rivet-setting machines is included) of the kind which include a driver plunger cooperating with an anvil which has a yieldable locating pin outstanding therefrom.

In a popular form of such machines the anvil is disposed at the outer end of a horizontal arm and the plunger is mounted for vertical reciprocating motion on a head which overhangs this arm in cantilever fashion, thus providing an area above the main length of the horizontal arm in which work can be introduced, manipulated, positioned, and supported. For convenience of exposition the anvil of the present invention will be described in this environment, it being understood that it is applicable to plunger/anvil arrangements in other rivetting machine constructions.

The locating pin referred to has the function of providing a physical restraint for positioning the work, or of providing a datum marking with which some index marking or feature on the work can be aligned. In many instances, for example, the work may comprise laminated sheets of board or other material which are to be rivetted together through prepunched holes, in which event the threading of the holes over the pin can quickly locate the sheets.

Another and very important function of the pin is to assist guidance of the rivet into the work during the actual rivetting. For this reason the pin is retractible into the anvil. When the plunger is brought down, contacts and drives forward the rivet, the leading end of the latter contacts the end of the anvil pin at a stage in its travel prior to its being upset by the anvil and, it maybe, in some cases, before its entry into the work. During the period between its first contact with the anvil pin and the end of its travel into the work the rivet is thus, in effect, clamped between the plunger and the anvil pin and thereby positively guided.

In known anvil arrangements of this character the pin is mounted for sliding movement into the anvil against the action of return spring means, viz a compression spring housed within the anvil and acting against the underside of a collar or equivalent on the pin.

As will hereinafter appear, this assembly has undesirable features in practical operation, which it is an object of this invention to obviate.

To this end the present invention provides an anvil, for the purpose and of the kind set forth in which the pin carries a piston element which is slidable in a hollow chamber within the body of the anvil, this chamber being equipped for connection to a source of compressed air sufficient to maintain the pin in its projected position but allow to yield under the force of the descending plunger.

A form of anvil according to this invention is illustrated in the accompanying drawings in which:

FIG. 1 is a diagrammatic illustration of the anvil showing its location in a rivetting machine,

FIG. 2 is an enlarged cross section showing details of the anvil per se.

The rivetting machine chosen for diagrammatic illustration in FIG. 1 is assumed to be that forming the subject of copending application Ser. No. 782,701 entitled "Rivet-setting machine" filed 10th Dec. 1968 by David Steggle. Illustrated is the frame 1 of the machine with its cantilever head 2 and its horizontal work support arm 3. The driver plunger carried by the head 2 is designated 4, this cooperating with the anvil, generally designated 5, which is disposed at the outer end of the support arm 3. 6 represents the rivet feed channel and 7 the rivet positioning pocket described in the aforesaid prior application.

The anvil 5 (see FIG. 2) comprises a cylindrical body 8 with

a smooth internal bore. It is provided with externally truncated threads 9, for example produced by grinding after the thread has been formed, and is fitted into a reamer hole in support arm 3. This enables it to be lined up accurately and maintained more readily in the correct position during prolonged use.

At its upper end the body 8 is closed by a solid frustoconical head 10. A screwed plug 11 is screw-threaded into the lower portion of body 8 to define a hollow chamber 12 in the latter. Screwed plug 11 can thus be screwed into or outwards of body 8 to vary the size of chamber 6, and it is clamped in the selected position by means of an external lock nut 13. Screwed plug 11 is provided with an axial bore 14 to which is connected a flexible tube 15 which leads to a source of compressed air, e.g. compressed air mains or a compressor.

Slidable in head 4 is a work locating pin 16 having a piston-forming collar 17 at its lower end within chamber 12. The compressed air in the latter, acting against piston 17, urges pin 16 into its fully projected position, but allows it to be depressed against the compressed air cushion in chamber 12 when pressure is exerted on pin 16 in use. Thus, in practice, the pin will yield, under load, against a comparatively uniform and constant resistance by the compressed air cushion and, when released by return of the rivetting plunger, or removal of the work, will return to its projected station at a rapid but a uniform rate. These are considerable attributes.

The load characteristics of a compression spring, as used in the prior art, vary to a high degree as the spring is compressed, to partly compensate for which the spring has to be of a substantial length and the yielding strength of the pin considerable to avoid complete dislocation, or at least uneven thrust of a rivet. Consequently the arrangement described above allows for a very rapid rivetting operation and also for a more positive and uniformly-controlled stroke.

There is no spring to undergo fatigue and require periodic replacement. Again, the fact that the pneumatic support, as it may be called, of the pin is of benefit, inasmuch as it eliminates the jarring which occurs, in the case of a spring-pressed pin, as a result of the arrest of the latter. As will be understood, in these latter instances the pin is accelerated by the unwinding spring and is travelling at a maximum speed when arrested. The system used in this invention provides a smoother and less noisy operation, and one which is less liable to dislocation and wear.

In practice the pin according to this invention, as described above, will be subject to projection and retraction strokes at a relatively rapid rate. This will, ultimately, mean somewhere between the sliding surfaces of the anvil body on the one hand, and the piston and pin on the other. Advantageously, therefore, the pin and piston will be of a less hard-wearing material than the anvil, since they can readily and inexpensively be replaced.

I claim:

1. In a rivetting machine comprising a driver plunger and an opposed member supporting an anvil which includes a yieldable work-locating pin, the improvement in which the anvil pin carries a piston element slidable in a hollow chamber within said opposed member, and means for connecting said chamber to a source of compressed air at a pressure to maintain said pin projected from said member but to allow it to retract at a substantially uniform rate under the force of the driving plunger.

2. The improvement of claim 1, in which the anvil has a hollow tubular body which defines said hollow chamber and has a solid, frustoconical upper end portion and is internally screw-threaded at its lower end portion to receive a screw plug which can be turned in the screw-threading to vary the volume of said hollow chamber.