

No. 700,481.

Patented May 20, 1902.

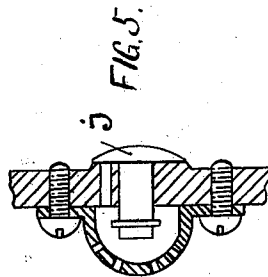
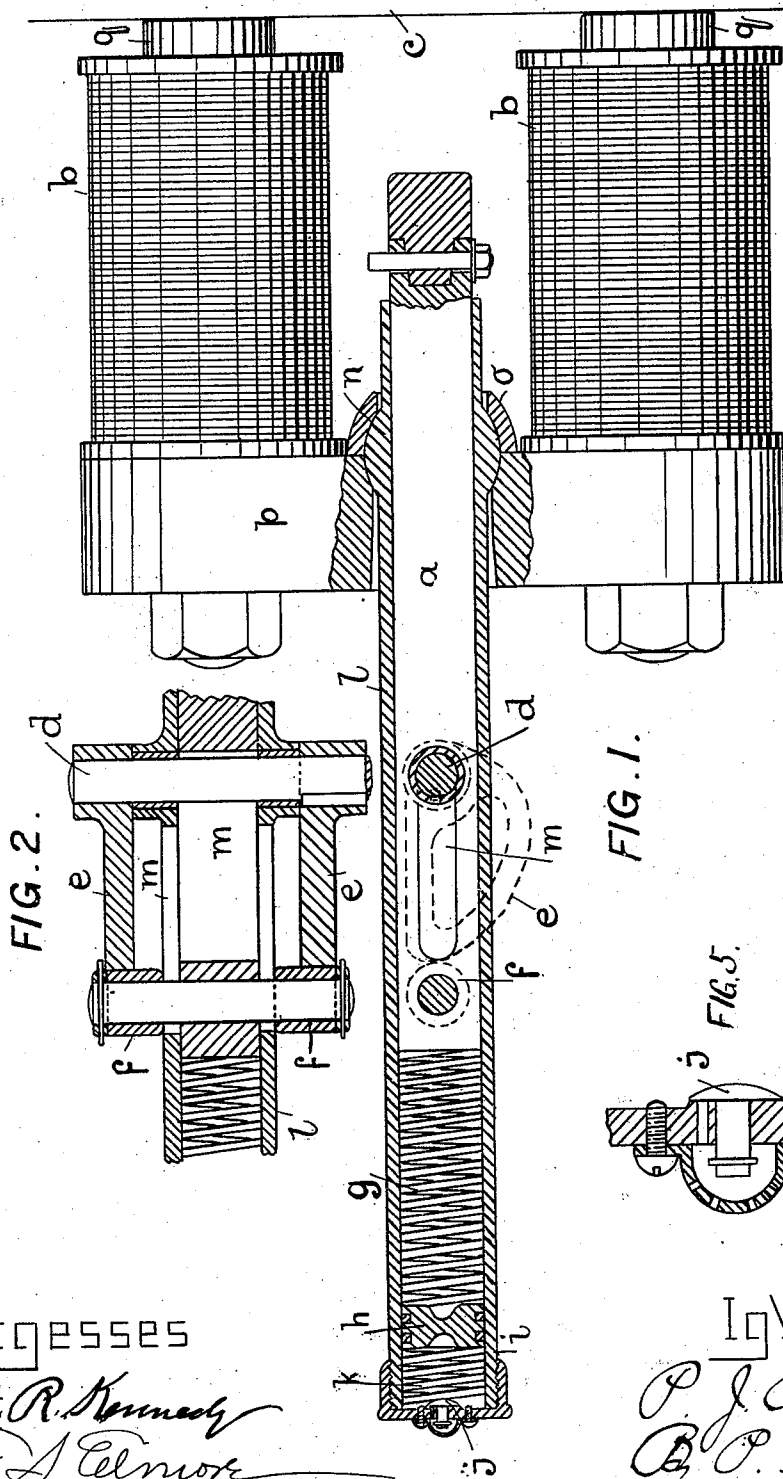
P. J. CHARLES.

PORTABLE RIVETING, &c., APPARATUS.

(Application filed Apr. 18, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses

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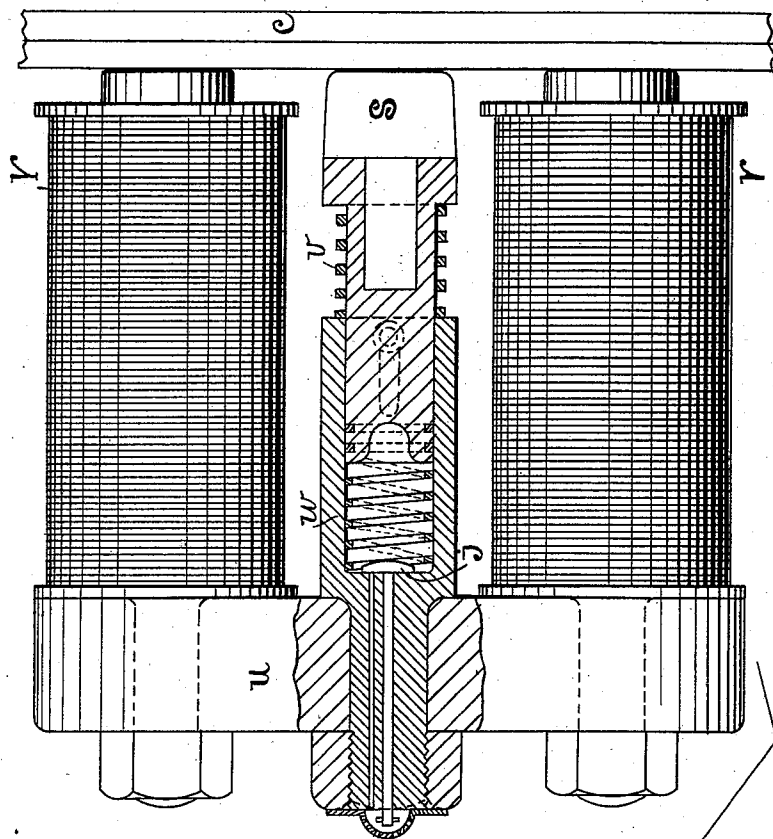


FIG. 3.

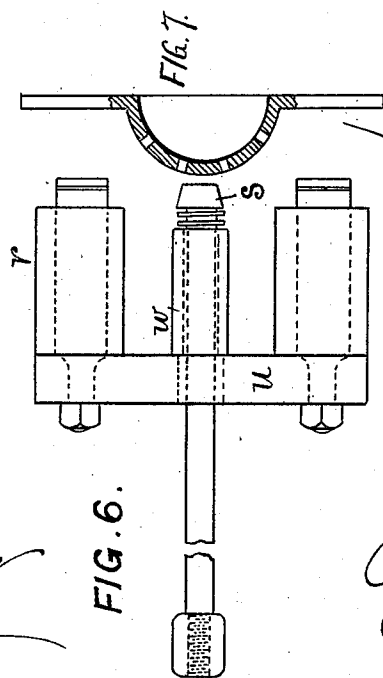


FIG. 6.

Witnesses

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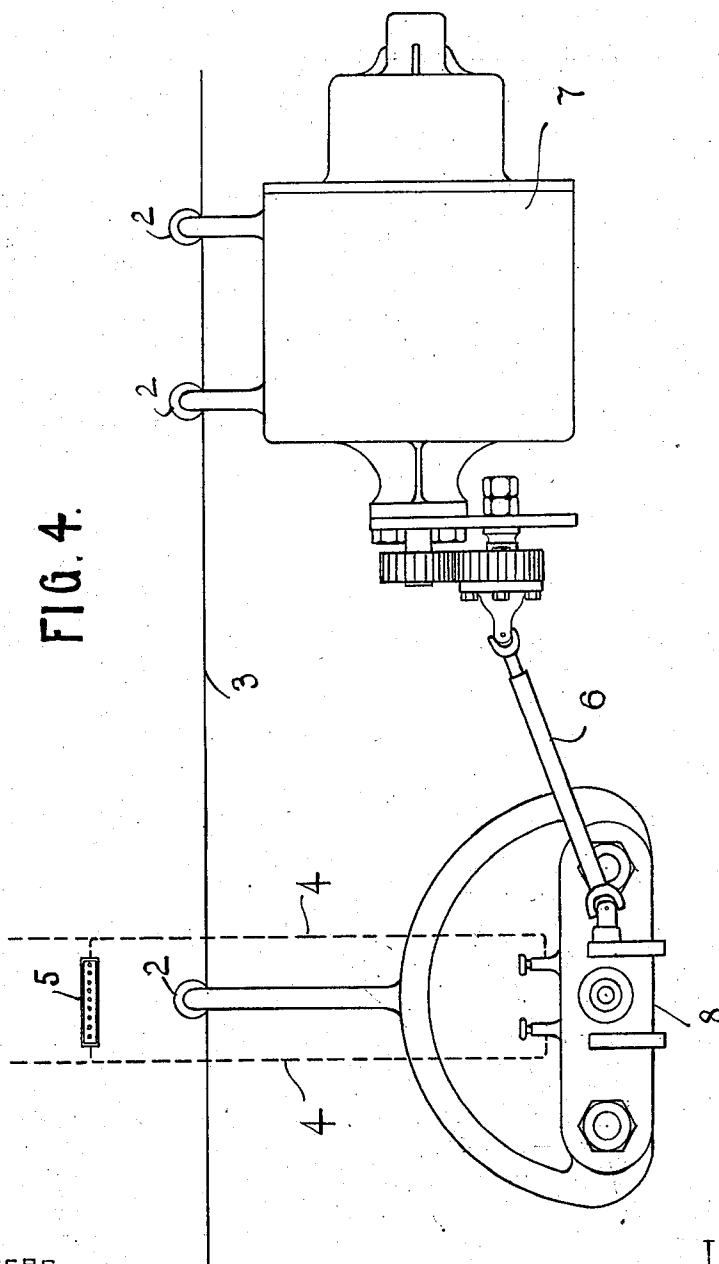
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3 Sheets—Sheet 3.



Witnesses

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UNITED STATES PATENT OFFICE.

PATRICK JAMES CHARLES, OF BELFAST, IRELAND.

PORTABLE RIVETING, &c., APPARATUS.

SPECIFICATION forming part of Letters Patent No. 700,481, dated May 20, 1902.

Application filed April 18, 1901. Serial No. 56,567. (No model.)

To all whom it may concern:

Be it known that I, PATRICK JAMES CHARLES, electrical engineer, a subject of the King of Great Britain, residing at the city of Belfast, Ireland, have invented certain new and useful Improvements in Portable Riveting, &c., Apparatus, (for which application has been made in England under No. 17,073, dated September 25, 1900,) of which the following is a specification.

This invention has for its object an improved portable apparatus in which the operations of hammering, punching, riveting, or calking are performed mechanically, also a holding-up device for use in conjunction therewith in riveting and like operations.

In the accompanying drawings, Figure 1 is a sectional elevation of the riveting-machine; Fig. 2, a sectional view of the cam device and its appurtenances, taken at right angles to Fig. 1; Fig. 3, a sectional elevation of the holding-up device. Fig. 4 is a side elevation of the riveter and the motor connected together by a universally-jointed telescoping shaft and suspended from an overhead wire. Fig. 5 is a view, on a larger scale, of the valve of one of the air-chambers. Fig. 6 illustrates a modified form of the holding-up device. Fig. 7 is a sectional view, on an enlarged scale, of the air-chamber valve.

As applied to riveting operations, I employ two apparatus—namely, a riveting apparatus, Figs. 1 and 2, and a holding-up device, Fig. 3. In the riveting apparatus I employ a reciprocating hammer-shaft *a*, actuated by an electromotor or other source of power, and holding-on electro or other magnets *b* for attaching the machine to any steel or iron structure, such as *c*. If electromagnets be the magnets employed, a rheostat is by preference provided to regulate the strength of adhesion to suit the various work being done. The reciprocating hammer-shaft *a*, which is provided at one end with a hammer-head, is operated by means of a rotary shaft *d*, driven, preferably, direct from an electromotor (preferably by a flexible shaft or a rigid one might be used) or other source of power, and on this rotary shaft *d* are cams *e*, which strike against rollers or studs *f* on the reciprocating shaft *a*, which cause the latter to reciprocate longitudinally at each rotation of the rotary

shaft *d*. At the opposite end of the shaft to that of the hammer-head is a spring *g*, interposed between the end of the shaft *a* and a piston *h* in an air-cylinder *i*. This piston *h* is practically air-tight and cushions the blow of the cam or cams *e* on the spring hammer-shaft *a*. Any leakage of air from the air-cylinder *i* is compensated for by providing a valve *j*, which opens inward only. Thus when the cam or cams *e* force the shaft *a* against its spring *g* the air is compressed in the air-chamber *i*, and this valve *j* is tightly closed on its seat, so that an air-cushion is formed; but when the piston *h* rebounds it draws in sufficient air through the valve to compensate for any leakage that has taken place. A spring *k* may be inserted in the air-chamber, if desired, to insure the rebound of the piston. In one form of my apparatus the hammer-bar is inclosed and guided for a considerable part of its length by a casing or outer tubular shaft *l*. A cross-slot *m* is provided in this outer tubular shaft *l* and also through the reciprocating hammer-shaft *a*. Through these slots *m m* the rotary shaft *d*, on which are fixed the cams *e*, passes, the cams being fixed on each side so as to strike against the rollers *f* or studs on the hammer-shaft *a*, which rollers or studs also project through the slots *m* in the outer tubular shaft *l*. Provision is made for placing the hammer-shaft *a* at any inclination within the range for which the machine is constructed. For this purpose the outside of the outer tubular shaft *l* near one end is made spherical externally at *n*, and this is mounted in a concave spherical bearing or socket *o*, fixed in the yoke or plate *p*, that connects the electromagnetic pole-pieces *q*, the hammer-bar *a* working, of course, in this outer tubular shaft *l*. The construction described constitutes a ball-and-socket joint, allowing the hammer-shaft *a* being inclined in any direction within the range for which the machine is constructed. It is obvious, however, that I do not confine myself to a ball-and-socket joint, as a trunnion or other suitable arrangement for placing the hammer-head at any required inclination for delivering the blows can be used in place thereof. Auxiliary springs could be provided on the striking-surface of the cams, so arranged as to absorb to a great extent the shocks occa-

sioned by the striking of the cams against the studs or rollers.

The holding-up device for riveting operations is attached to the iron or steel structure by an electro or other magnet *r*, the same as the riveting device. It comprises a bolster or holding-up head *s*, which is mounted, preferably, in a socket or cylinder, also secured to the yoke or plate *u*, that connects the magnetic pole-pieces. The bolster or holding-up head *s* has a spring *v*, which causes the bolster to instantly spring back after the blow has been delivered, and it has also a spring or air-cushion directly behind it, which absorbs to some extent the blows delivered by the hammer-shaft *a* on the other side of the plate *c* being riveted. This air-cylinder *w* has a valve similar to that described in connection with the riveting apparatus.

In action the cams *e* on the rotary shaft of the riveting apparatus strike against the rollers or studs *f* on the hammer-shaft *a*, sliding the latter longitudinally and compressing the spring *g*. Immediately the cams have passed the rollers *f* the hammer-bar *a* flies back by the action of spring *g* and delivers the blow, and the continuous revolution of the cams *e* thus sets up a rapid reciprocation of the hammer-head, which gives the rapid hammering or riveting strokes against the rivet. The inclination of the hammer-shaft *a* can be changed at pleasure while the machine is in operation.

If desired, the air-cushion *k* could be dispensed with and an iron-clad magnet employed in place of the electromagnets. This class of magnet has a very powerful grip, which will cause it when the blow has been struck to rebound into position and immediately reattach itself.

If desired, the head or bolsters *s* of the holding-up device can be dispensed with and tools of any suitable shape or configuration applied to the work to suit confined or restricted spaces.

The invention as applied to hammering, punching, and calking will be obvious without further description.

Fig. 6 shows the hammer-bar of the holding-up device extended in length, so that it can be laid hold of by the operator and used as a device for driving home the rivet preparatory to the magnetism being applied.

In thus describing the invention I wish it to be understood in conclusion that I do not confine myself to the exact details set forth, as these can be altered to some extent without departing from the nature of the invention. Thus, for example, a device such as shown in Fig. 4 may be employed for suspending the apparatus and preventing it from falling off should the magnets release their hold. The riveting apparatus 8 and the motor 7 are suspended by small pulleys 2 from an overhead wire 3. This wire might, however, be replaced by another suitable supporting device. The riveter 8 is shown to be

connected by wires 4 to a rheostat 5 for regulating the current and the electromagnets, and a telescoping universally-jointed shaft 6 is shown connecting the motor to the riveter. The wire 3, with the pulleys 2 running thereon, allows considerable play to the apparatus, so that it can be shifted from hole to hole along the plates.

I claim as my invention—

1. In a portable riveting, punching and like apparatus, the combination of a cylinder, a shaft having a hammer-head at its end adapted to be guided in the axis of said cylinder, a piston air-tightly packed in said cylinder, a compression-spring between said shaft and said piston, means for forcing back said shaft intermittently against the action of said spring and piston, and means for holding said apparatus upon the work-piece, substantially as set forth.

2. In a portable riveting, punching and like apparatus, the combination of a support-frame, means for holding said frame upon the work-piece, a shaft having a hammer-head at its end slidably mounted in said frame, means for imparting a backward movement to said shaft, a cylinder at rear of said shaft, a piston fitting in said cylinder, a compression-spring between said piston and said shaft, an inwardly-opening valve upon said cylinder and a spring in said cylinder at rear of said piston, whereby the piston is caused to rebound after compression, so that air is permitted to enter the cylinder through the valve to replace any that may have escaped during compression.

3. In a portable riveting, punching and like apparatus the combination of a support-frame, means for holding said frame upon the work-piece, a guide mounted in said support-frame, a shaft having a hammer-head at its end mounted in said guide, a compression-spring at the rear of said shaft, a piston at the rear of said spring, an air-compression cylinder in which said piston fits, an inwardly-opening valve on said cylinder, and means for intermittently forcing back said shaft against the pressure of the spring and the compressed air.

4. In a portable riveting apparatus comprising a riveter and a holding-up device adapted to be separately held upon the work-piece by non-mechanical means, the combination of a shaft having a hammer-head at its end, an air-compression cylinder, a piston in said cylinder in connection with said shaft, means for intermittently forcing back said shaft against the action of said piston, means for forcing forward said shaft after each backward movement, a bolster in said holding-up device, means for pressing forward said bolster, and an air-cushion behind said bolster whereby it is forced toward the work-piece to support the rivet.

5. In the holding-up device of a riveting apparatus, the combination of a support-frame, means for holding said frame upon the

work-piece, a cylinder in said frame, a bolster adapted to fit in said cylinder and directly connected with a holding-up head, a spring adapted to force said bolster out of said cylinder, and an inwardly-opening valve on said cylinder whereby air may enter to replace any air which may have escaped when the bolster was forced backward.

6. In a portable riveting, punching and like apparatus, the combination of a support-frame *p*, a cylindrical guide-sleeve *l* mounted in said support-frame, a shaft having a hammer-head at its end adapted to slide in said guide-sleeve, a spring *g* at rear of said shaft, a piston *h* at rear of said spring, a cylinder in which said piston fits, an inlet-valve *j*, and means for intermittently pressing back said shaft against the action of said spring and piston.

7. In a portable riveting, punching and like apparatus, the combination of a support-frame *p*, a cylindrical guide-sleeve *l* mounted in said support-frame, a shaft having a hammer-head at its end adapted to slide in said guide-sleeve, means for imparting a backward movement to said shaft, a spring *g* at rear of said shaft, a piston *h* at rear of said spring,

a cylinder in which said piston fits, an inlet-valve on said cylinder, and a spring in said cylinder at rear of said piston *h*, whereby the piston is caused to rebound after a compression so that air may be caused to enter by the valve to replace any air that may have escaped during compression.

8. In a holding-up device for a riveting apparatus the combination of a support-frame *u*, a cylinder *w* mounted in said support-frame, a bolster fitting in said cylinder, a holding-up head *s* attached to said bolster, an inwardly-opening valve *j* on said cylinder, and a spring adapted to force said bolster outwardly from said cylinder, whereby the bolster always rebounds in the cylinder after compression and causes air to enter through the valve *j* to replace any air that may have escaped during compression.

In witness whereof I have hereunto signed my name, this 12th day of March, 1901, in the presence of two subscribing witnesses.

PATRICK JAMES CHARLES.

Witnesses:

G. C. DYMOND,
CHAS. E. STEVENS.