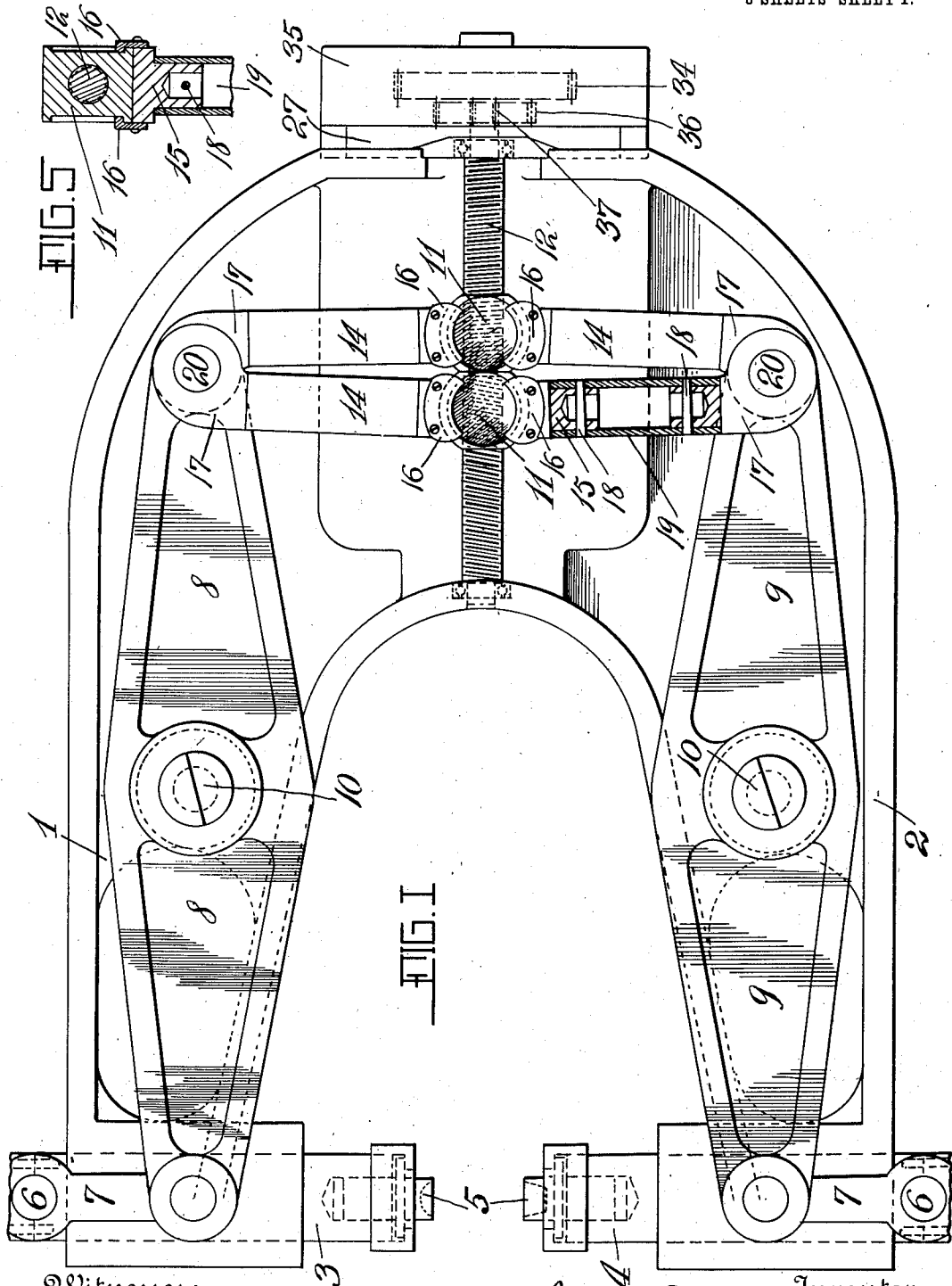


J. BURKE.
ELECTRIC RIVETING MACHINE.
APPLICATION FILED JUNE 13, 1907.

Patented May 27, 1913.

3 SHEETS—SHEET 1.

1,062,883.



Witnesses:
Geo. A. Hoffman
Geo. W. Kerr

James Burke Inventor
By his Attorneys
Edward Sager & Wooster

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3 SHEETS—SHEET 2.



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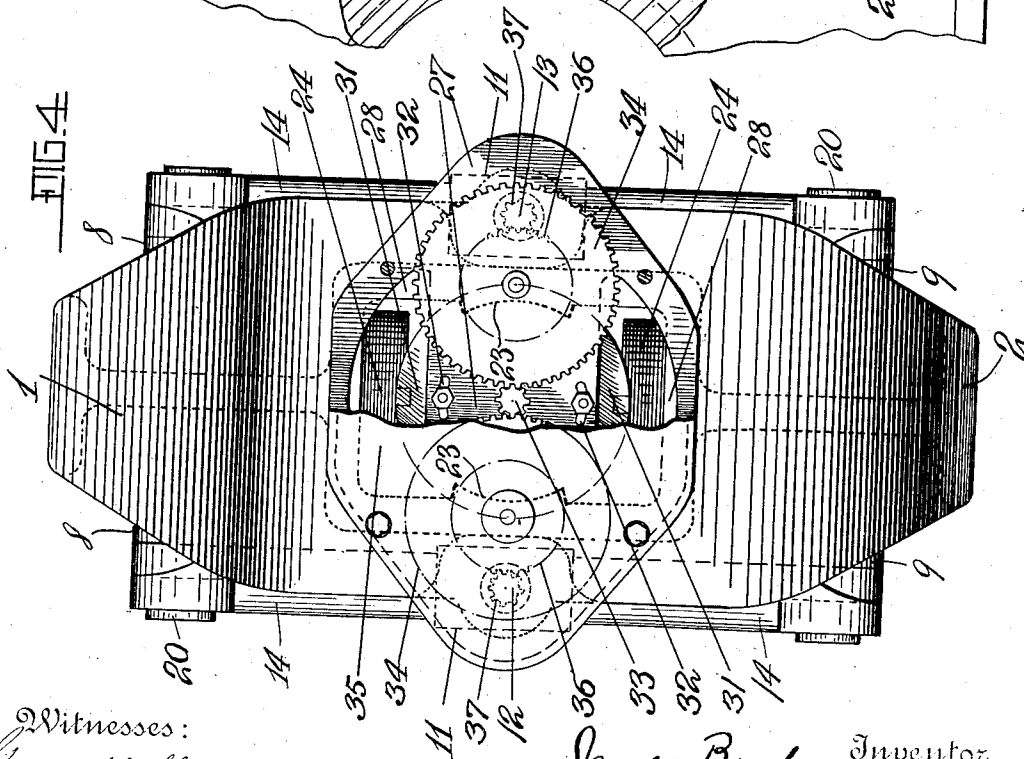
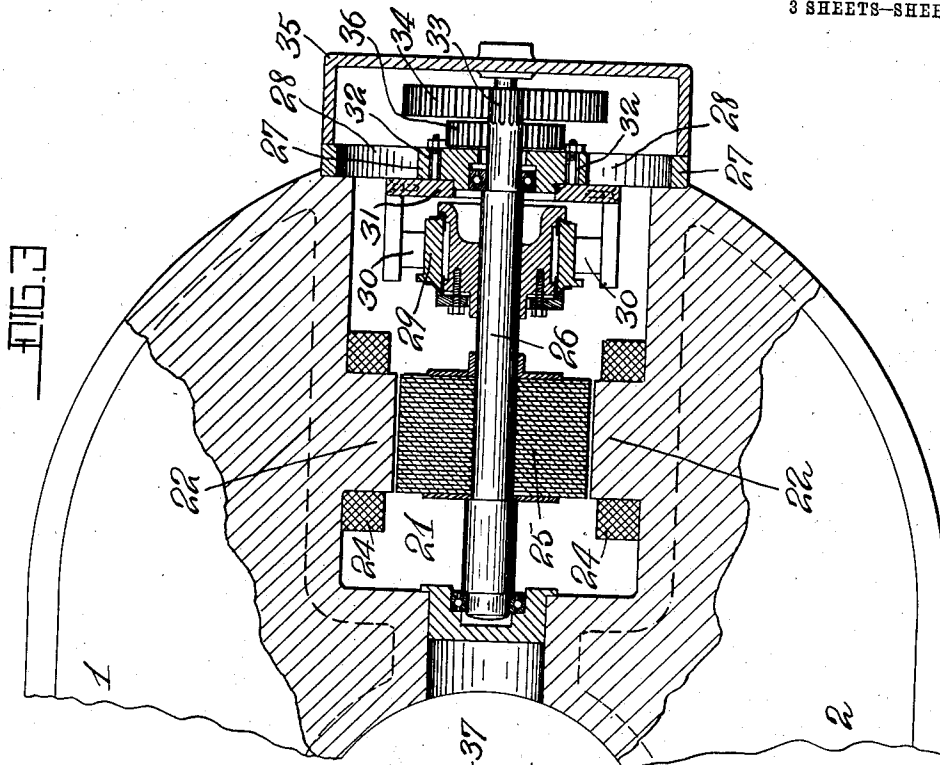
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UNITED STATES PATENT OFFICE.

JAMES BURKE, OF ERIE, PENNSYLVANIA, ASSIGNOR TO CHICAGO PNEUMATIC TOOL COMPANY, A CORPORATION OF NEW JERSEY.

ELECTRIC RIVETING-MACHINE.

1,062,883.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed June 13, 1907. Serial No. 378,711.

To all whom it may concern:

Be it known that I, JAMES BURKE, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Electric Riveting-Machines, of which the following is a full, clear, and exact specification.

This invention relates to compression riveting machines, punches and the like, and is a machine of this class which is electrically operated. Heretofore, so far as I am aware, machines for doing this work have been operated by steam, air or water pressure.

A further object of my invention is to provide a machine of this class which shall be efficient, of simple and compact construction, shall possess great strength, have the strains equalized and balanced and shall be easily portable.

These and other features of my invention will be understood from the following description and accompanying drawings which disclose one form of my invention in which,

Figure 1 is an elevation of my improved machine, some parts being in section; Fig. 2 is a plan view with certain parts broken away and partly in section; Fig. 3 is an elevation with parts broken away, and also partly in section; Fig. 4 is a rear elevation with part of the gear casing broken away; Fig. 5 is a section showing details; and Fig. 6 is a diagram of electrical connections.

Referring to the drawings, the machine is shown in the general form of a yoke, the two branches of which are adapted to straddle the work to be acted upon. The yoke is in general skeleton form as indicated for securing great strength and lightness. The branches 1, 2 of the yoke are provided with guides at their outer ends for the rams 3, 4 which carry the rivet sets or dies 5 of the particular character desired. At the outer ends of the two rams 3, 4 are cross pins 6, which in turn are connected by links 7 to two oscillating arms 8 on opposite sides of the branch 1 of the yoke and to two similar oscillating arms 9 on opposite sides of the branch 2 of the yoke. These arms are pivoted well in toward the head of the yoke upon cross pins 10, as shown, the fulcrum of the oscillating arms being thus comparatively near the head of the yoke. The outer ends of the branches 1, 2 therefore receive

only the light strains required for guiding the rams, which permits the outer parts to be comparatively light and of long reach if desired. The inner ends of the oscillating arms 8, 8 are connected together by cross pins 20 passing through an end opening in the web of the yoke frame and the inner ends of the arms 9, 9 are similarly connected. The inner ends of the arms are also each connected to a nut 11 which travels upon the two screws 12, 13. The top and bottom of each nut 11 is cylindrical as indicated in Figs. 1 and 5, and upon these cylindrical surfaces bear the inner ends of the links 14 which connect the nuts to the ends of the oscillating arms 8, 8, 9, 9. The links 14 are shown as made up of an inner end portion 15 which engages the cylindrical bearing surfaces of the nut 11, and is connected thereto by clamps 16 which engage an undercut portion of the nut. The outer portions 17 of the links 14 are pivoted on the inner ends of the oscillating arms, and these outer portions and the inner portions 15 are cored as indicated, and a sleeve 19 engages and connects each outer and inner portion, the parts being connected by pins 18. The two arms 8, 9 on each side are connected to the same nut 11 as shown in Fig. 1, and the whole thus forms a number of toggle joints when the nuts travel along the screws 12, 13. The two screws 12, 13 are oppositely threaded from the middle outward so that the rotation of the screws in one direction will cause the nuts 11 to travel toward the outer ends of the screws and thus separate the rams, while rotation of the screws in the opposite direction will cause the nuts to travel toward each other, and thus cause the rams to move in the opposite direction to engage the work acted upon.

An important feature of my invention is that instead of mounting an independent motor upon the yoke for rotating the screws 12, 13, or instead of separately mounting the motor, I provide that a part of the steel forming the yoke shall also form the field magnet of the electric motor and at the same time the yoke will serve to inclose and protect the motor. By reason of this feature, I greatly reduce the weight of the machine and insure convenience in handling and freedom from breakage. I also make the parts easily accessible. In carrying out

these features of my invention, I form an opening 21 in the head of the yoke within which extends the field poles 22, 22 and 23, 23 and which extend from the main yoke frame. The two poles 22 are made of sufficient length to carry the field coils 24, 24, and the direction of current in these coils is such as to make the polarity of the poles 22 the same, and the poles 23 therefore become consequent poles of opposite polarity. This arrangement secures a four pole motor of small width so as to be conveniently located between the screws 12, 13. Within the magnetic field thus formed is located the armature 25 mounted upon shaft 26, which latter is journaled at its inner end in the frame of the yoke, and at its outer end in a bearing head 27, which latter is secured to the yoke covering the outer end of the opening 21. In the bearing head 27 are formed two openings 28. Between the bearing head and the armature 25 is located the commutator 29 on the armature shaft 26, the armature windings and connections not being shown in Fig. 3 for clearness. The commutator brushes 30 are carried by a brush yoke 31, which in turn is supported by the bearing yoke and fixed in any desired position by bolts extending through slots 32 in the bearing yoke.

On the outer end of the armature shaft is cut a pinion 33 which drives two gears 34 on opposite sides thereof. These gears are mounted upon spindles journaled in the bearing yoke and in the gear casing 35, which is bolted over the bearing yoke and incloses the various parts. Fixed to the spindles upon which gears 34 are mounted, are smaller gears 36, which in turn engage and drive pinions 37 on the screw shafts 12, 13. Thus, when the motor is rotating in one direction the screw shafts 12, 13 will be rotated in such a direction that the nuts 11 will travel from the middle toward the outer ends of these shafts, and when the electric motor is rotating in the opposite direction, the nuts 11 will travel toward each other to the middle of the screw shafts.

The electric motor is preferably of the series wound type, and the reversal of the motor may be obtained by any suitable form of reversing switch which will reverse the direction of current through either the field or armature. The connections of the motor are indicated in Fig. 6 diagrammatically, in which the motor armature is indicated at 38, the field windings at 39 and a switch for reversing the direction of current in the armature is indicated at 40. In series with the motor is connected an adjustable resistance 41 for the purpose of limiting the maximum current which may be passed through the motor when operated from a constant potential circuit. The adjustment of this resistance will therefore prevent the

motor from receiving current above a predetermined limit, and this adjustment will also determine the maximum torque delivered by the motor. The maximum compression strain to be exerted upon the work acted upon by the rams 3, 4 is therefore adjusted to any desired amount by adjusting the resistance 41.

In operation, the work being in place and the resistance 41 adjusted to give the desired compression strain, current is introduced into the motor so as to give the desired direction of rotation. The motor drives the screws 12, 13 through the gearing as above explained, and causes the nuts 11, which are assumed to be at their outer positions, to travel toward each other. This forces the rams together, and if the work presents a resistance to the rams as great as the compression strain for which the machine has been adjusted, the motor will stop when such strain is attained. The resistance 41 will prevent an excessive current from flowing and the motor will thus be protected from excessive current. On the other hand, if the work does not present a resistance to the rams as great as the compression strain for which the motor has been adjusted, the movement will continue until the nuts 11 engage each other at the middle position when the motor will stop, the resistance 41 then serving to protect the motor as before. Reversal of the current through the motor armature will then cause opposite movement of the nuts and open the rams when the next rivet or other work may be acted upon as already explained.

Various means for adjustment of the parts may be used as desired in a manner obvious to those skilled in the art; for example, the links 14 may be made adjustable by use of a turn-buckle, or by providing a series of holes through the different parts so that the pins 20 may be passed through at any point desired, also sleeves of different lengths may be removably clamped upon the middle of the screws 12, 13 for limiting the minimum distance between the nuts and so determine the distance between the rams when in their innermost position and similarly sleeves may be clamped over the outer ends of the screw shafts for determining the outermost positions of the rams. Also it may sometimes be desirable to use reversing gears instead of reversing the rotation of the motor, and change gears or interchangeable gears may be used. Also if it is desired to operate the machine continuously, which may be desirable for certain classes of work, any form of automatic electrical or mechanical reversing device may be readily applied to my improved machine.

My invention is susceptible of various other modifications without departing from the spirit of my invention.

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Having thus described my invention, I declare that what I claim as new and desire to secure by Letters Patent is,—

1. In a machine of the class described, a
5 ram, a main frame for supporting the ram
and driving parts, and an electric driving
motor, the said frame serving as the field
frame of the motor.

2. In a machine of the class described, a
10 ram, a main frame for supporting the ram
and driving parts, an electric driving motor,
the said frame serving to inclose the motor
and form the field frame thereof.

3. In a machine of the class described hav-
15 ing a yoke frame, a ram, and an electric
motor within the head of the yoke for driv-
ing the ram, the head of the yoke forming
the field frame for said motor.

4. A machine of the class described having
20 a yoke, an electric motor within the head of
said yoke, and means comprising a ram sup-
ported by said yoke for acting upon the
work, said means being driven by said motor.

5. In a machine of the class described, a
25 yoke frame, a ram, an arm pivoted on said
frame for operating the ram, an electric
motor inclosed by the head of said frame for
operating said arm, and means between said
motor and said arm for multiplying the
30 force exerted.

6. In a machine of the class described, a
yoke frame, a ram, an arm pivoted on said
frame for operating the ram, an electric
motor inclosed by the head of said frame for
35 operating said arm, and means between
said motor and said arm for increasing the
force exerted comprising a screw shaft.

7. In a machine of the class described, a
40 yoke frame, arms mounted on each branch
of said yoke, rams operated by said arms,
an electric motor mounted within the head
of said yoke, and means driven by said
motor for operating said arms.

8. In a machine of the class described, a
yoke frame, arms pivoted on the two 45
branches of said frame, rams operated by
said arms, an electric motor inclosed by the
head of said yoke frame, and means com-
prising a toggle between said motor and
said arms for multiplying the force exerted. 50

9. In a machine of the class described, a
yoke frame, arms pivoted on the branches of
said frame, rams operated by said arms, an
electric motor inclosed by the head of said
yoke frame, and means comprising a screw 55
shaft between said motor and said arms for
multiplying the force exerted.

10. In a machine of the class described, a
yoke frame, arms pivoted on both sides of
each branch of said yoke, an electric motor 60
inclosed by the head of said yoke frame, and
means on both sides of said yoke frame
driven by said motor for operating said
arms.

11. In a machine of the class described, a 65
frame, arms pivoted on said frame, rams
operated by said arms, an electric motor in-
closed by said frame, and means for operat-
ing said arms from said motor comprising
a right and left hand screw, traveling nuts, 70
and connections between said nuts and said
arms.

12. In a machine of the class described, a
pair of rams, arms for operating said rams,
a right and left hand screw shaft, two 75
traveling nuts on said screw shaft, means
for driving each of said arms from each of
said nuts, and means for rotating said screw
shaft.

In testimony whereof I affix my signature, 80
in presence of two witnesses.

JAMES BURKE.

Witnesses:

S. K. SAGER,

GEO. A. HOFFMAN.