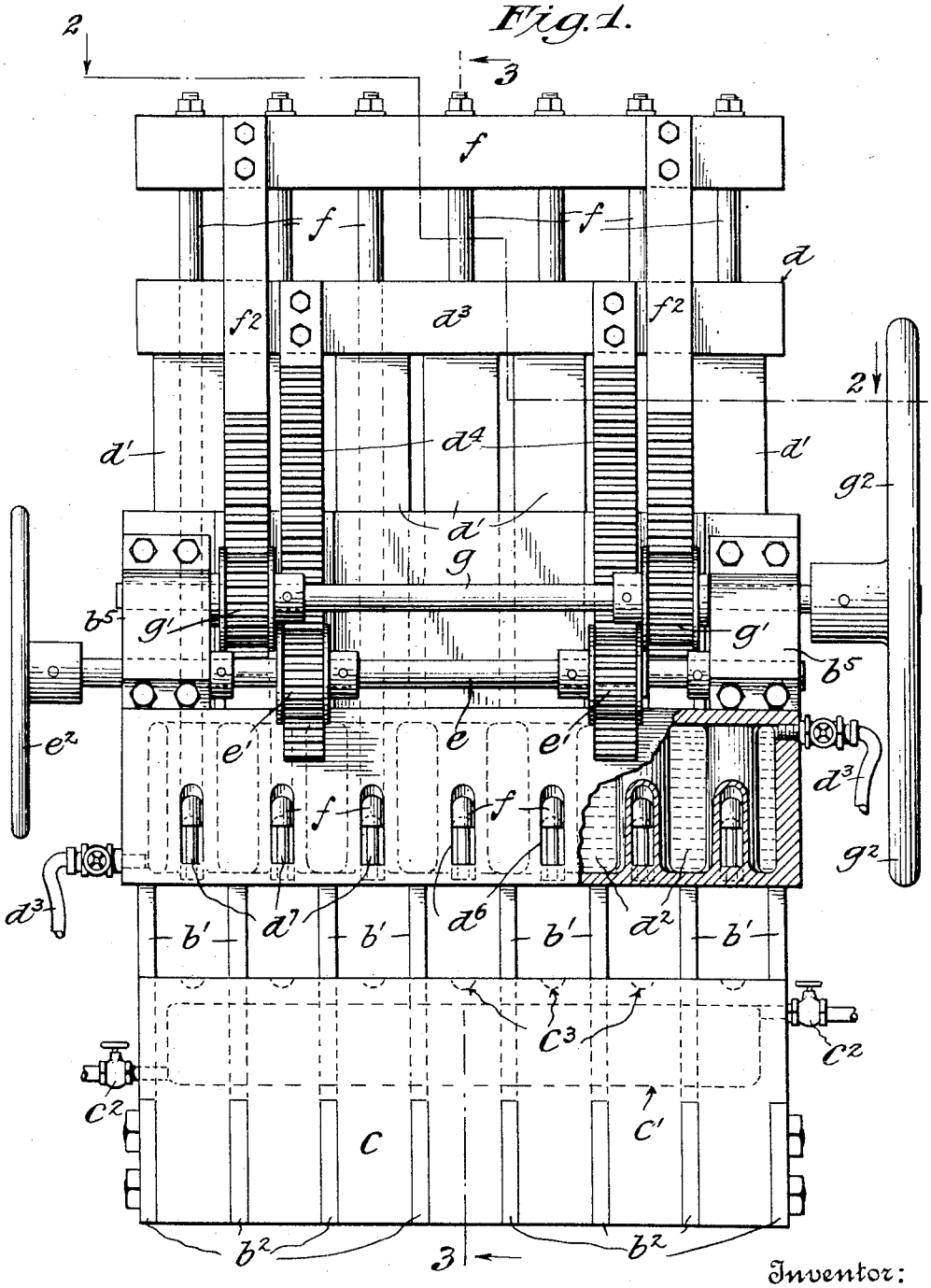
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RIVETING MACHINE

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Fig. 1.



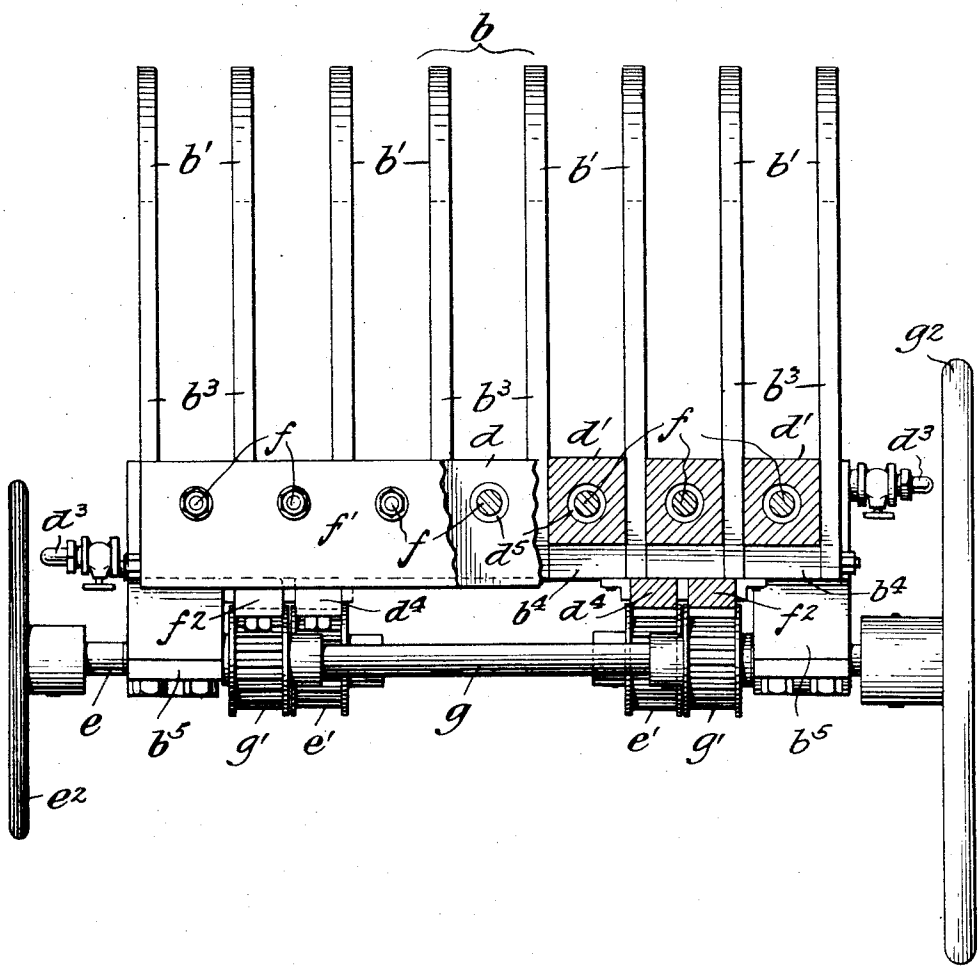
Inventor:
Samuel F. Tapman
By his Attorneys
Redding, Greeley, O'Shea and Campbell

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RIVETING MACHINE

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Fig. 2.



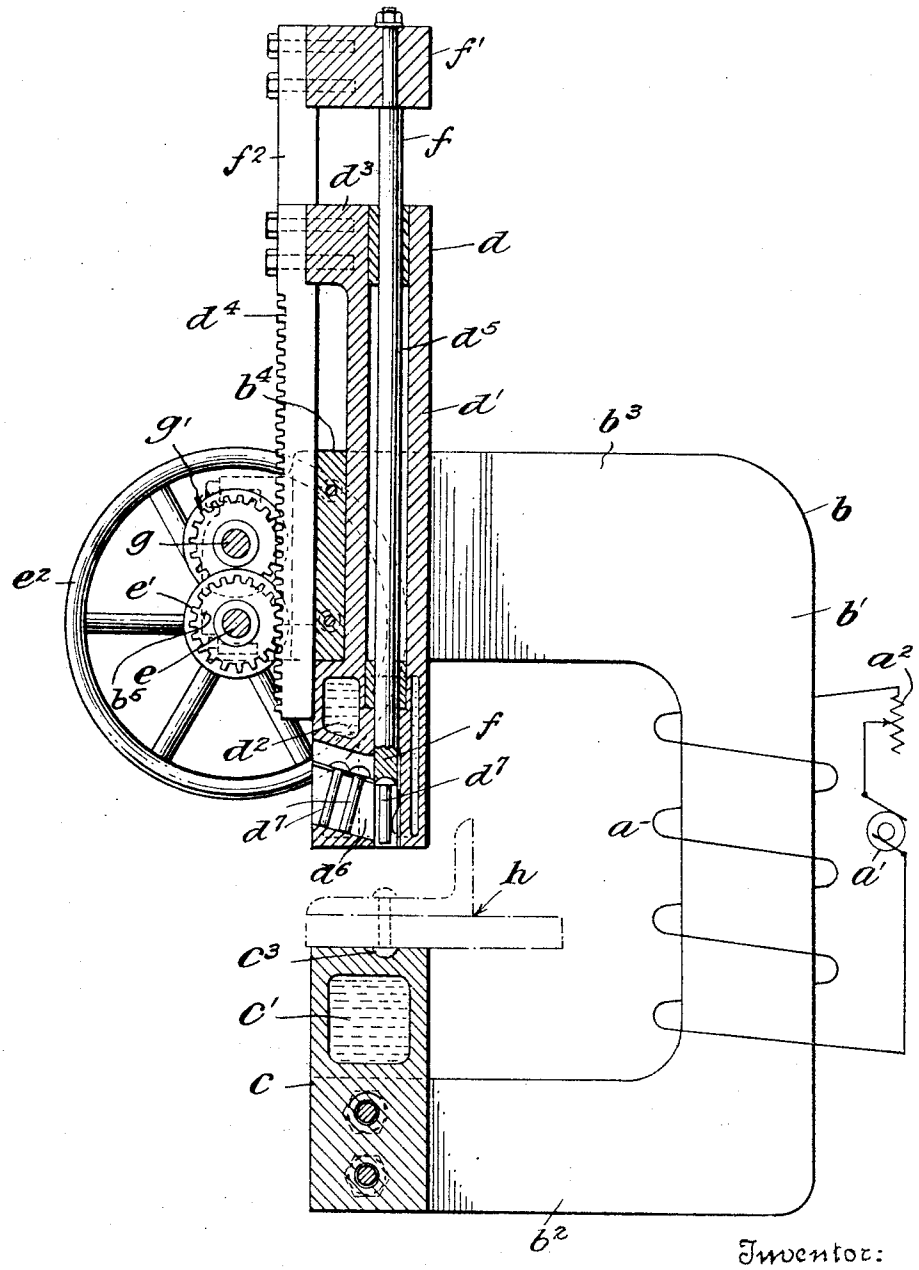
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Fig. 3.



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Patented Feb. 21, 1933

1,898,468

UNITED STATES PATENT OFFICE

SAMUEL F. TAPMAN, OF JAMAICA, NEW YORK

RIVETING MACHINE

Application filed February 27, 1929. Serial No. 343,085.

The present invention relates to riveting machines and embodies, more specifically, an improved form of machine for driving rivets through metal plates after first heating the plates to a desired temperature to enable the rivet to be driven through and headed without requiring a punching or cutting operation.

In the copending application of Samuel F. Tapman, Ser. No. 214,296 filed August 20, 1927, for method and apparatus for riveting, since matured into Patent No. 1,721,263, dated July 16, 1929, there is described a method and apparatus for riveting, wherein an electric current is passed through the plates to be riveted, the rivet being heated substantially simultaneously and driven through the plates at the proper time. The current is controlled in a manner such that the heating takes place in the desired time, and the entire operation of riveting takes place in an extremely brief period of time. The present invention embodies an improved machine for carrying out the method described in the foregoing application and enables the electric current to be applied to the metal plates and rivets in an economical and effective manner, the rivets being readily inserted in the machine to facilitate the operation thereof and permit successive riveting operations to take place without loss of time.

An object of this invention, therefore, is to provide a riveting machine which does not require a great amount of manual supervision, the riveting operations being performed with great speed and efficiency. It is further contemplated to provide means for driving a plurality of rivets simultaneously, the heading and driving thereof being accomplished in such manner that none of the metal of the plates is lost, this metal being distributed about the rivets to strengthen the joints materially.

A further object of the invention is to provide a machine which is simple in operation and easily controlled, the parts thereof being easily constructed and of great strength.

The above objects are attained by the provision of a machine formed by a yoke section which serves as the secondary of a transformer. It is proposed to supply a current of the desired characteristics to the primary of the transformer, the characteristics thereof being variable in order to control the operation of the machine. Upon one side of the yoke a stationary head or anvil is formed upon which the work rests. The other side of the yoke is provided with a movable head within which a plurality of plungers are movably mounted. When the work is placed upon the anvil and the movable head lowered to engage and hold the work, the circuit of the secondary is closed and a heavy current flows through the work causing it to become heated. After a predetermined degree of heating has taken place, the plungers are lowered, rivets previously having been placed under the plungers in order that the latter will drive them through the work in their downward movement. As soon as the rivet touches the work, a current will flow through the rivet and heat it sufficiently to be headed by the time it is driven through the work. In this manner, the riveting operation is performed quickly, effectively, and with great facility.

Further objects not specifically enumerated above will appear as the invention is described in greater detail in connection with the accompanying drawings, wherein:

Figure 1 is a view in front elevation, partly broken away and in section, showing a preferred form of the invention.

Figure 2 is a plan view, partly broken away and in section, the section being taken on line 2—2 of Figure 1, and looking in the direction of the arrows.

Figure 3 is a view in section, taken on line 3—3 of Figure 1, and looking in the direction of the arrows.

Referring to the above drawings, a indicates the primary of a transformer which is connected in a circuit including a source of alternating current a' and a variable resistance a^2. The secondary of the transformer is composed of the yoke b of the riveting machine, this yoke being formed of a plu-

rality of copper plates b' of suitable width and thickness to carry the current used.

The lower arms b^2 of the yoke members b' are secured to a stationary anvil c which is formed with a hollow section c'. A cooling fluid flows through the hollow portion of the anvil and is controlled by means of valves c^2 in order to prevent overheating of the anvil. Matrices c^3 are formed in the anvil to receive the rivet as it is drawn through the work and turn the end thereof into a head.

The upper arms b^3 of the yoke members carry a block b^4 by which extensions d' of movable head d are carried. The extensions are slidably mounted and are of conducting material in order that current may pass from the block b^4 to the movable head d. In order that the movable head may not be overheated, it is proposed to cool this head in a manner similar to that in which the stationary head is cooled, and to accomplish this, ducts d^2 are formed in the head to receive a cooling fluid from flexible hose connections d^3.

It will be seen that the extensions d' are spaced apart by the yoke portions b', the current thus flowing to the extensions through three sides thereof. An upper head d^3 is formed on the extensions d' and projects outwardly to carry a rack d^4 between which, and the extensions d', the block b^4 is received. The lower end of the rack d^4 is secured to the front of the head d and a power shaft e carrying a pinion e' and a suitable power source e^2 supplies the power to drive the rack and associated structure. The power shaft e is carried in suitable journal blocks b^5 formed on the block b^4.

In each extension d', an axial passage d^5 is formed, these passages receiving relatively movable plungers f for driving the rivets. The plungers are mounted in a movable head f' to which racks f^2 are secured, a power shaft g, pinions g' and power source g^2 serving to move the head and plunger in an obvious manner. The axial passages d^5 extend through the movable head d and rivet chutes d^6 communicate with the lower extremities thereof as clearly seen in Figure 3. The lower extremities of the plungers, of course, are formed with concave portions to receive the rivet heads as they are fed from the chutes d^6.

In operation, the circuit of the primary transformer is closed and the work h placed upon the anvil c. Power shaft e is then rotated to lower the movable head d against the work h. As soon as contact is made between the head d and work h, the circuit of the secondary of the transformer is closed and current flows through the work. This current is of sufficient strength to heat the work to a desired temperature in order that the rivet may be driven through easily. Rivets d^7, having previously been placed in the rivet chutes d^6, are moved under the plungers f. After a sufficient heating of the work has taken place, the movable head f' and plungers f are forced downwardly by rotation of wheel g^2 and power shaft g. In the downward movement of the plungers f and rivets d^7, the latter will contact with the work h and current will flow through the rivets. By the time the rivets have been driven through the work, they will have been heated sufficiently by this current flow to be easily headed in the matrices c^3.

It will be readily apparent that the speed of the riveting operation may be varied by changing the characteristics of the primary circuit of the transformer and any suitable power means may be employed to rotate the shafts e and g. Although the invention has been described in connection with the specific construction shown in the accompanying drawings, the parts thereof may be changed in form, arrangement and design to suit the individual requirements in use, and the invention is not to be limited, save as defined in the appended claims.

I claim as my invention:

1. A device of the character described comprising a plurality of spaced yokes, a coil about the yokes to energize the same electrically, an anvil on the adjacent open ends of the yokes, a stationary head on the other adjacent open ends of the yokes, a movable head carried by the stationary head and formed with extensions lying between and engaging the yokes, rivet magazines formed in the movable head, and rivet driving means carried in each of the extensions on the movable head and communicating with the magazines.

2. A device of the character described comprising a plurality of spaced yokes, a coil about the yokes to energize the same electrically, an anvil on the adjacent open ends of the yokes, a stationary head on the other adjacent open ends of the yokes, a movable head carried by the stationary head and formed with extensions lying between and engaging the yokes, rivet magazines formed in the movable head, and rivet driving means carried by the movable head and communicating with the magazines.

3. A device of the character described comprising a plurality of spaced yokes, a coil about the yokes to energize the same electrically, an anvil on the adjacent open ends of the yokes, a stationary head on the other adjacent open ends of the yokes, a movable head carried by the stationary head and formed with extensions lying between and engaging the yokes, and rivet driving means carried in each of the extensions on the movable head.

4. A device of the character described comprising a plurality of spaced yokes, a coil about the yokes to energize the same electrically, an anvil on the adjacent open ends of the yokes, a stationary head on the other adjacent open ends of the yokes, a movable head carried by the stationary head and formed with extensions lying between and engaging the yokes, and rivet driving means carried by the movable head.

5. A device of the character described comprising a yoke having spaced ends, a coil about the yokes to energize the same electrically, a water-cooled anvil on one of the ends, a stationary head on the other end, a water-cooled movable head carried by the stationary head, and a rivet driving means carried by the movable head.

6. A device of the character described comprising a yoke having spaced ends, a coil about the yokes to energize the same electrically, an anvil on one of the ends, a stationary head on the other end, a movable head carried by the stationary head, and a rivet driving means carried by the movable head.

This specification signed this 26th day of February A. D. 1929.

SAM'L F. TAPMAN.