No. 728,936. PATENTED MAY 26, 1903.

P. F. KING.

RIVETING MACHINE.

APPLICATION FILED OCT. 31, 1898.

NO MODEL.

Fig. 1.

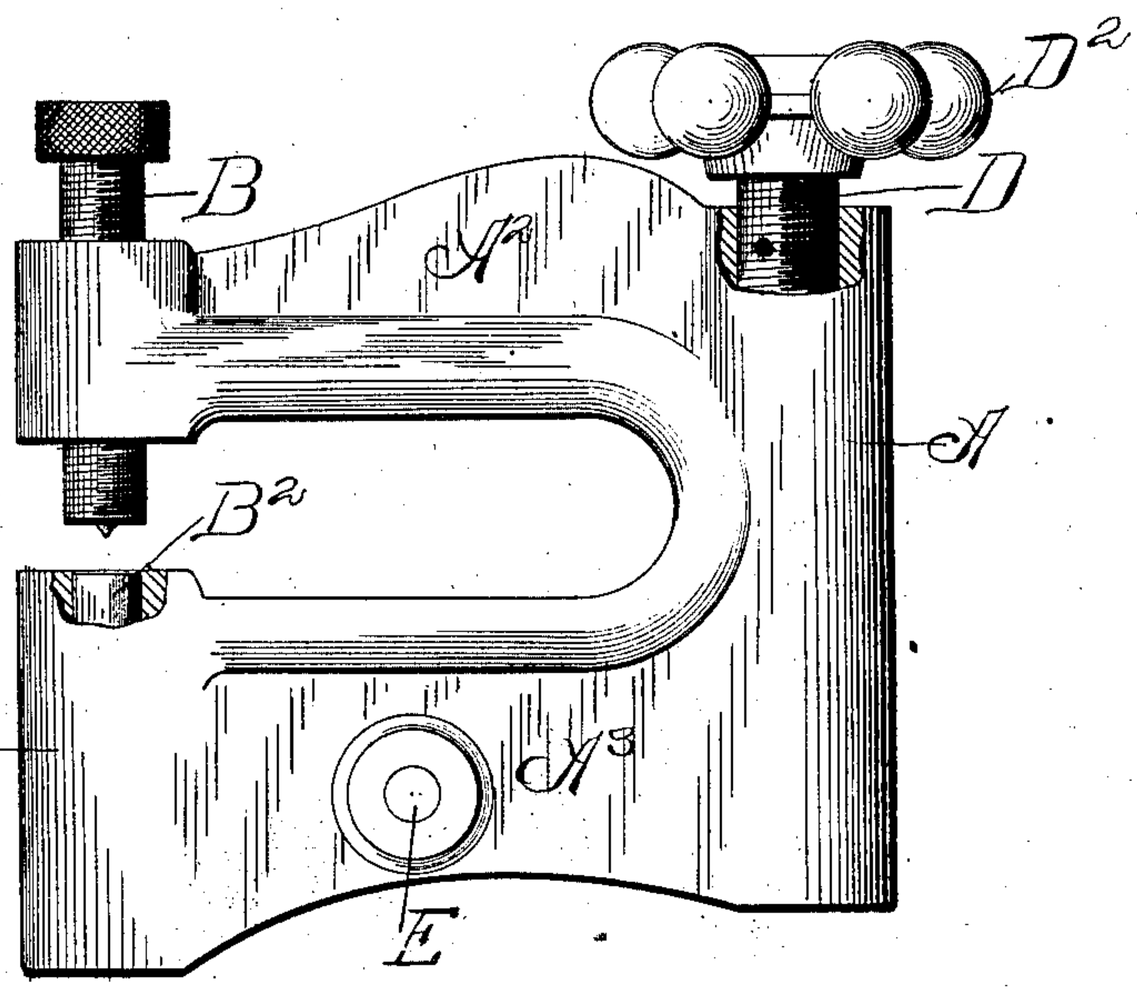

Fig. 3

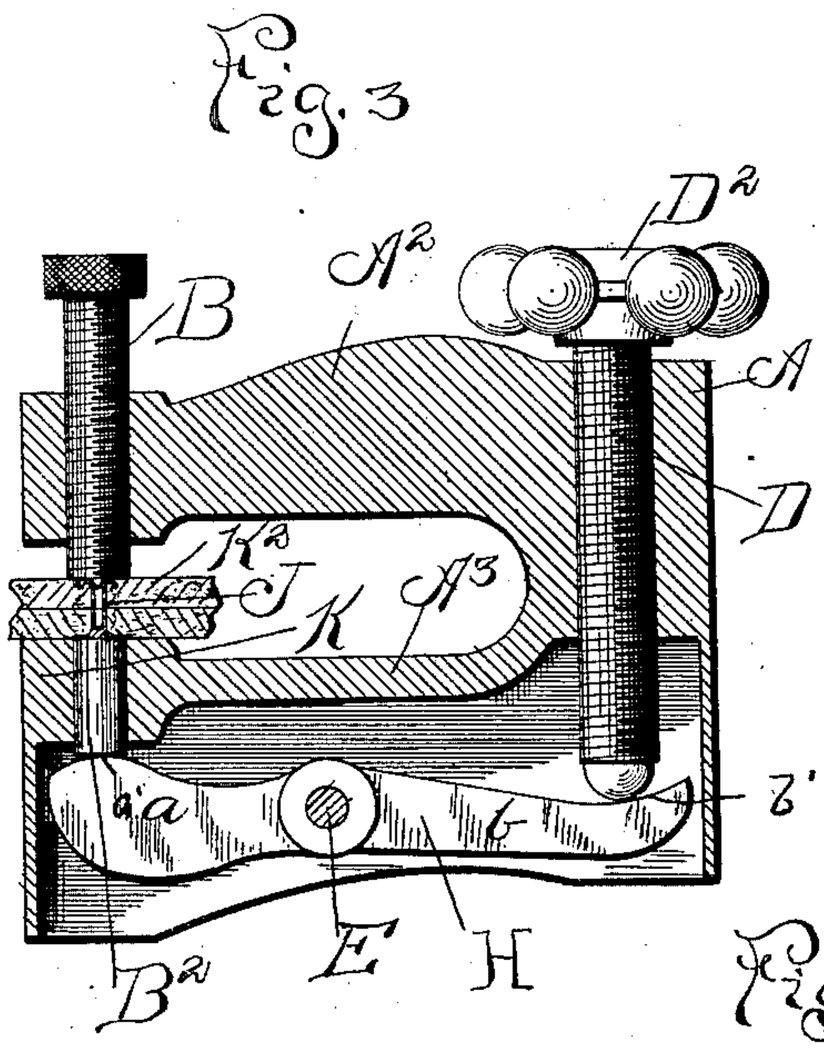

Fig. 2.

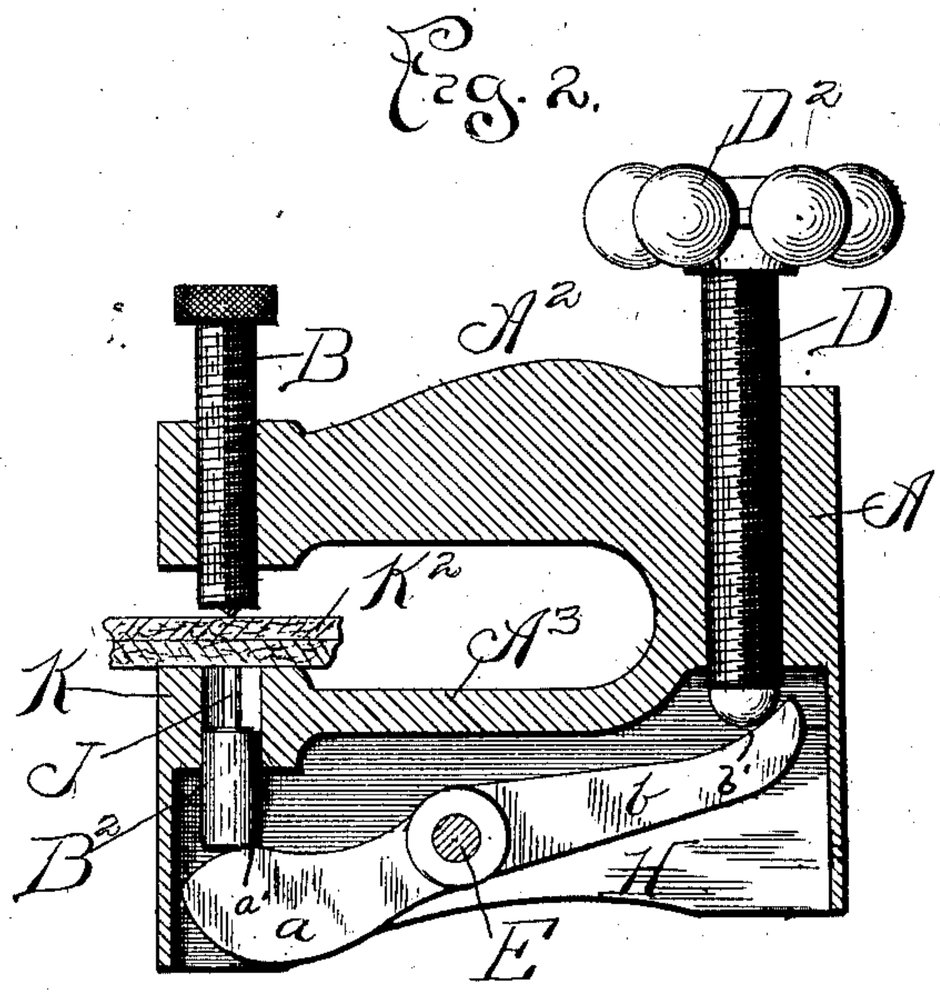

Fig. 4.

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No. 728,936. Patented May 26, 1903.

UNITED STATES PATENT OFFICE.

PHINEAS F. KING, OF CLEVELAND, OHIO, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ADELBERT C. REED, OF CLEVELAND, OHIO.

RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 728,936, dated May 26, 1903.

Application filed October 31, 1898. Serial No. 695,010. (No model.)

To all whom it may concern:

Be it known that I, PHINEAS F. KING, a citizen of the United States of America, and a resident of Cleveland, Cuyahoga county, Ohio, have invented a certain new and useful Improvement in Riveting-Machines, of which the following is a specification.

My invention relates more particularly to certain improvements in riveting-machines which are operated by hand.

In the well-known type of machine which employs a screw to fasten the rivets several objectionable features are present. The rotative movement of the screw causes the end thereof bearing against the rivet-head to grind off the enamel on the rivet-head, leaving it exposed to become rusty and unsightly. Attempt has been made to remedy this defect by the interposition of a separable pin or piece between the end of the forcing-screw and the rivet; but this separable pin or piece located between the rivet and the end of the screw when subjected to the pressure of the screw is bound between the rivet and the screw, and consequently rotates with the screw. In existing machines it is exceedingly difficult to drive the rivet through pieces of leather, and when the leather is hard or exceedingly tough or it is desired to force the rivet through pieces of metal it is necessary to previously make a hole through the material. This is necessary, because with such material for the rivet to penetrate the pressure capable of application to the rivet is insufficient to drive it through the resisting body of the material.

The object of my invention is to provide in a compact unitary structure a riveting-machine which shall be capable of applying a pressure upon the rivet of such power as to invariably and positively force the rivet easily through either hard or tough leather or metal pieces and clench or upset the rivet end when driven through; to accomplish this result with a machine which cannot rotate a member against the rivet-head, the pressure upon the rivet-head being a direct thrust, and yet utilize a screw in accomplishing the ultimate result, and to locate the point of application of the power above the machine instead of underneath or below it.

My invention consists in certain novel features of construction and arrangement of parts hereinafter described and claimed.

Figure 1 is a side elevation of a completed machine or implement, showing the full preferred size of the device. Fig. 2 is a vertical central section through the device, showing the two pieces of material and the rivet adjusted in position with the parts in readiness to force the rivet through the material and clench it in position. Fig. 3 is a like view showing the material in section with the parts in the position assumed when the rivet has been driven through the material and clenched in position. Fig. 4 is perspective view of the rivet.

The frame-casting has a body portion or stock and the two projecting arms A^2 and A^3. Extended through the extreme outer free end of the upper arm A^2 is the fastening and upsetting screw-stem B, which is adapted for vertical adjustment toward and from the holding-pin or seat B^2, movable within the extreme outer free end of the lower arm A^3. Extended through what I have termed the "body portion" A is the forcing-screw D, the operating handle or wheel D^2 for said screw being secured to the upper end of the screw in a convenient position for manipulation.

Pivoted at E is a rocking lever H, which is disposed within the lower arm A^3. The lower end of the screw D engages the extremity of this lever on one side of the pivot E, and the said lever at its other extremity on the other side of said pivot in turn engages the lower end of the holding or seating pin B^2.

Having now described the general construction of the device and the relative position of its parts, I shall proceed to describe the mode of operation and point out some of the advantages derived.

Referring first to Fig. 2, it will be observed that the rivet J is positioned upon the holding-pin or seat B^2, this holding-pin being sheathed within what may be termed the "anvil" K of the lower arm A^3. To accomplish this result, the screw D must be withdrawn to such an extent as to permit the weighted short arm *a* to assume its lowermost position. The two pieces of material, either leather or metal, to be riveted (designated at K^2) are

then disposed upon the anvil with the upper end of the rivet impinging upon the lower side of the material at the proper point of riveting. The fastening and upsetting screw B is then adjusted, with its upsetting end bearing on the material at a point in line with and opposite to the upper end of the rivet. The handle or wheel D^2 is then turned and the forcing-screw D rotated, pressing the long arm *b* of the rocking lever H downward and raising the short arm *a* of said lever upward to in turn press or force the holding-pin or rivet-seat upward, and thereby drive or force the rivet through the material to be upset and clenched on the side of the material opposite to the head of the rivet.

To obtain a maximum of leverage in a machine of a given size, I pivot the rocking lever in such manner as to provide a long arm, to which the force of the screw is applied, and a short weighted arm for transmitting and applying its force to the movable rivet-seat or pin, the two ends of the lever being provided with curved or inclined surfaces *a' b'*, in slip contact, respectively, with the movable rivet-seat and the forcing-screw. The cam-surface *a'*, which contacts with the rivet-seat, is preferably convexed, so that as the short arm *a* rises the rivet-seat will ride up upon it with the least amount of friction, and the cam-surface *b'* is preferably concave, so that as the screw is forced down the lower end thereof will slide down the incline with a minimum of friction and with a sort of wedging action. It is obvious that the cam-surface *b'* will incline upward and rearward and be so positioned on the lever that it normally bears against the lower end of the screw practically during its entire movement. When the last riveting pressure is applied, the end of the lever rests flatly or directly upon the end of the holding-arm or seat, as shown in Fig. 3, and the end of the lever under the screw is standing at incline under easy forcing pressure. By means of this lever I am enabled to utilize the force of a screw, compound it by the lever and at the same time apply a direct upward thrust to the holding-pin or seat, thus avoiding the application of a spiral or rotative movement to the holding-pin or seat to injure the rivet. The object of convexing the antifriction-surface *a'* and inclining the cam-surface *b'* upward and rearward where the screw bears upon it is that the power applied to the screw is still further augmented, thereby enabling me to produce a very compact and powerful machine, which shall be especially adapted for forcing rivets through metal or hard leather or other hard resisting materials without previously punching holes therein. Thus employing a cam or wedge surface to augment the power of the lever tends to the loss of speed of course; but this loss of speed in the present case is fully compensated for by the increased power and the compactness secured, the whole purpose of my invention being to secure the maximum degree of power with a given area and a given number of parts. That the power will be augmented will be understood when it is kept in mind that the device brings into action the well-known law of the resultant of forces, by which the direct downward thrust of the screw is combined with the lateral thrust caused by the wedge-shaped cam-surface, the increase in power being proportioned to the loss in speed and the loss in speed being determined by the degree of inclination of the cam-surface. It will be seen that to secure this augmentation of power the rear arm of the lever must incline upward from the pivot, so that the contact-point of the screw against the lever shall travel inward toward the pivot as the screw descends. Furthermore, it will be observed that the lever normally extends in an inclined direction, with the concave cam-surfaced end *b'* above a horizontal line drawn through the fulcrum-point. By this construction, in connection with the hand-screw D, mounted to have a fixed vertical movement, the leverage of the lever is gradually decreased as it is moved from its normal position, and thus gradually and slightly decreasing the power applied to the rivet. This is due to the fact that the end of the screw D, traveling in a vertical direction, does not follow the movement of the end of the lever; but as the lever approaches the horizontal the contact between the screw and lever is brought closer to the fulcrum-point, thus increasing the movement of the lever, the movement of the screw remaining the same. This movement of the lever increasing as it does causes the greatest power to be applied to the rivet initially at a time when the greatest power is required and decreases as the thickness of the material to be penetrated becomes less, and thereby obviating an uneven movement of the rivet through the material and insuring a neat and strong result. In order that the rivet may fall automatically into the proper position, with the holding-pin sheathed, I weight the short arm of the said lever.

I have shown a tubular rivet J in Fig. 4, as it is designed to use this character of rivet in connection with my machine or implement, although it is not necessary to confine its use to such a rivet.

Having thus described the principle of my invention and one way in which it may be carried into practice, what I claim as new, and desire to secure by Letters Patent, is—

1. In a riveting-machine, the combination of a pair of members for compressing or upsetting the rivet, one of said members being in the form of a plunger, a lever pivoted between its ends and having its shorter end portion engaging the lower end of said plunger, the longer end of said lever being provided with a cam portion, said lever normally extending in an inclined direction with the longer end above a horizontal line drawn through the pivot-point of the lever, and a

rotary hand-screw having its lower end rounded and adapted to bear downwardly upon the inclined or beveled surface presented by said cam portion, whereby the leverage is decreased as the lever is moved from its normal position.

2. In a riveting-machine, the combination of a rotary hand-screw, a plunger arranged for reciprocation parallel to said hand-screw, a coöperating upsetting member adapted and arranged to oppose the pressure of said plunger, and a lever fulcrumed between its ends and serving as medium of connection between said hand-screw and said plunger, said lever having a sliding contact with both the hand-screw and the plunger, the transmission of power from the hand-screw to the lever, and also from the latter to the plunger, being thereby augmented in each case by the action of the cam, said lever normally extending in an inclined direction with the hand-screw-contacting end above a horizontal line drawn through the fulcrum-point of the lever, whereby the leverage will be decreased as the lever is moved from its normal position.

Signed by me at Cleveland, Cuyahoga county, Ohio, this 24th day of October, 1898.

PHINEAS F. KING.

Witnesses:
THOMAS A. O'ROURKE,
JOHN MAHON.