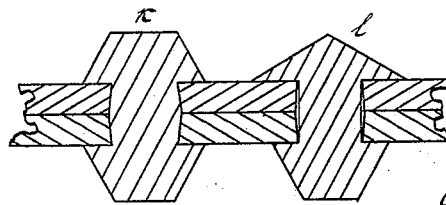
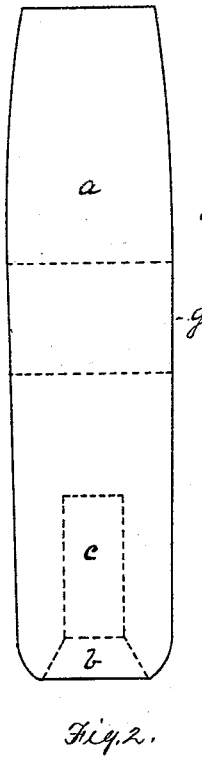
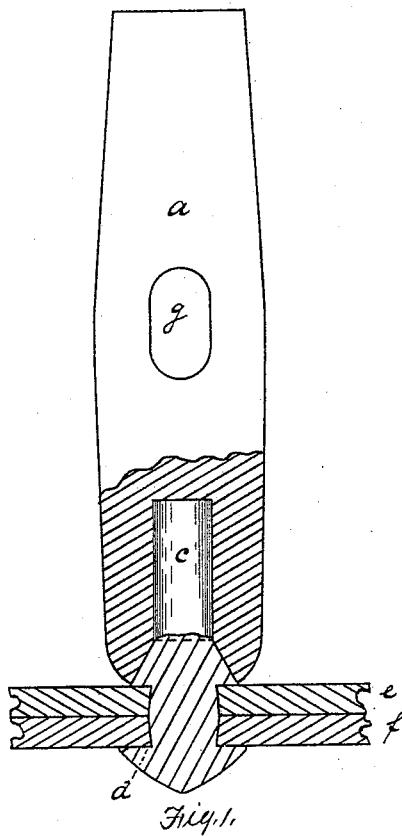


(No Model.)

A. F. CLINCH.
RIVETING TOOL.

No. 304,505.

Patented Sept. 2, 1884.



Witnesses

L. C. Fittler.
J. H. Smith

Fig. 3.

Inventor

Andrew F. Clinch
by his attorneys
Baker & Co.

UNITED STATES PATENT OFFICE.

ANDREW F. CLINCH, OF YORK, ASSIGNOR TO HIMSELF, AND JAMES B. CLINCH,
OF PITTSBURG, PENNSYLVANIA.

RIVETING-TOOL.

SPECIFICATION forming part of Letters Patent No. 304,505, dated September 2, 1884.

Application filed September 14, 1883. (No model.)

To all whom it may concern:

Be it known that I, ANDREW F. CLINCH, of York, in the county of York and State of Pennsylvania, have invented a new and useful
5 Improvement in Riveting; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to an improvement in rivet-sets; and it consists in forming the operating-face of the cavity of the set at an angle of from ten to forty degrees with the axis of the cavity, so that the direction of the force applied shall operate at an angle toward the axial line of the rivet; and, also, in elongating
15 the cavity of the set for the purpose of forming an air-cushion in the cavity, and also affording a space for any surplus metal in the rivet-head, and preventing the formation of a fin or burr around the head of the rivet during
20 the riveting operation, as hereinafter more fully appears.

In hand-riveting, as is well known, the rivet, having a head at one end of a plain cylindrical shank, is first heated to a welding-heat,
25 and then inserted through two corresponding holes in the plate or plates to be riveted together with the head portion downward, which is supported by a holding-on sledge, which serves as an anvil to sustain the rivet during
30 the riveting operation. The small end or shank of the rivet is then upset by a hammer, and by repeated blows is formed into a head.

In order to produce a perfectly-tight joint, three results have to be accomplished, first,
35 the shank of the rivet (which, even when heated, is slightly smaller than the rivet-holes in the plate or plates) must be staved up so as to fill the rivet-hole; second, a head must be formed on the projecting end of the rivet; and,
40 third, the newly-formed rivet-head must press so tightly down on the surface of the plate as to draw the original head of the rivet closely against the under surface of the plates, so as not only to hold the two plates firmly together,
45 but also to make a perfectly air-tight and steam-tight joint. In hand-riveting, the operation is tedious and requires careful and skilled labor, and, as the blows of the hammer are often chiefly directed in a line substantially
50 coincident with or parallel to the axis of the rivet, the effect of which is to drive the origi-

nal head downward, it is difficult to swell the shank of the rivet so as to perfectly fill the rivet-hole, or to pinch the plates firmly together between the original head and the upset head of the rivet. Each blow of the hammer takes effect only on the point struck, and has a tendency to counteract the effect of previous blows struck at other points of the rivet.

In order to enable a workman to successfully form the head on the rivet without the knowledge and skill required in hand-riveting, and in order to reduce the amount of labor required, button-sets have been employed, which, as heretofore used, have been tools
65 having a shallow cavity, generally of the shape of a half-sphere or low cone, which cavity is placed on the upset end of the rivet and struck repeated blows with a heavy sledge or hammer. This tool, however, does not accomplish
70 the object desired, and is objectionable in that it does not fulfill any one of the requirements hereinbefore mentioned. Where the upset end of the rivet contains an amount of metal equal to or greater than the space in the cavity,
75 the metal spreads out on the plate, forming a fin or burr, which prevents any further force being applied to the shank of the rivet within the hole in the plates, and as the direction of the force applied is parallel to or coincident
80 with the axis of the rivet, the metal is merely spread out on the plate, or the original head is driven downward. Where, however, the amount of metal in the end of the rivet to be upset is not sufficient to fill the cavity of the
85 set and also form the head, the edges of the set come in contact with the plate which receives the force of the blows, and consequently the riveting operation cannot be satisfactorily
90 completed.

The object of my invention is to produce a rivet-set which, when applied to the end of the rivet to be upset, will direct the force of the blows of a hammer toward the axial line of the rivet-shank within the holes in the
95 plate, so as to completely fill these holes, will form a perfect head on the free end of the rivet, and will draw the original head closely against the lower face of the plate.

I will now describe my invention, so that others skilled in the art may manufacture and use the same, reference being had to the ac-

companying drawings, forming part of this specification, in which—

Figure 1 is a view of my improved rivet-set, partly in section. Fig. 2 is a side view of the same. Fig. 3 is a sectional view of a rivet produced by my improved set, and a view of a rivet produced by the old form of "button-set."

Like letters of reference indicate like parts wherever they occur.

In the drawings, *a* represents the rivet-set, in one end of which is the cavity *b*, the operative face or sides of which incline at an angle of from ten to forty degrees to the axis of the cavity—that is to say, the face of this portion of the cavity bears the form of a cone or truncated cone, the sides or face being at an angle of from ten to forty degrees with its axis. Above this cavity *b* is a further cavity, *c*, which may be cylindrical in form, extending on the line of the axis of the cavity *b*, and having a diameter substantially the same as the diameter of the shank of the rivet. This cavity *c* may be merely a prolongation of the cavity *b*, forming a single cavity having the shape of a cone, the face extending at the angles aforesaid with its axis. I prefer, however, to form the cavities as shown in the drawings. The other and upper face of the set is a plane surface, so as to receive the blows from a hammer or sledge. Passing through the set is the usual handle-hole, *g*, which should not intersect the cavities before mentioned.

The operation of riveting with my improved set is as follows: The rivet, after having been heated to a welding-heat, is placed in the rivet-hole *d* in the plates *e* and *f* in the usual manner. This hole *d* in the plate or plates is formed in each plate separately, so that when brought together the sides of the holes shall bevel in opposite directions, as shown in the drawings. The holding-on sledge is then placed and held in position under the original head of the rivet. The free end of the rivet is then upset by a few blows from a hammer, after which the cavity of the set is applied to the upset end of the rivet, and the set is driven down by repeated blows from a hammer until the face of the set has nearly reached the top plate. The set is then removed, and the end of the rivet is again upset with a hammer, so as to increase its diameter, after which the set is again applied and driven down, and these operations are repeated as often as may be desired, until the face of the set comes in contact with the plate, which completes the riveting operation. When the end of the rivet is first upset and the set is applied, as described, the force of the blows of the hammer is directed from the face of the cavity toward that portion of the axis of the rivet within the hole *d*, and thereby the metal is staved up so as to fill the hole; also, after each blow of the hammer has struck the set, the air confined in the cavity *c*, acting as a

cushion, slightly lifts the set, and thereby each blow of the hammer on the set causes a corresponding stroke of the set on the rivet.

Owing to the angle of inclination of the face of the cavity in the set, the metal in the shank of the rivet is spread laterally within the holes in the plates, which has a tendency to shorten the shank of the rivet, and thus draw the original head of the rivet upward, thus drawing the lower head of the rivet closely against the lower plate, the effect produced being a contraction of the metal which projects upward into the cavity of the set instead of the opposite or spreading effect produced by the old form of set; and it is owing to this drawing of the metal that it becomes advisable and sometimes necessary to remove the set and again upset the head, as before described.

Owing to the supplemental cavity *c* in the set, the rivet is never struck by the set on its axial line, so that not only is the metal not driven downward on a line with or parallel to the axis of the rivet, but also the formation of fins or burrs is prevented, owing to the drawing action of the set and the space for the reception of surplus metal.

The head formed by my set is not a low button or cone, such as is generally produced by hand and button-set riveting, but is, where the form of set shown in the drawings is employed, a counterpart of the original head in size, shape, and strength.

My invention possesses another advantage hardly less important than those enumerated, in that less labor is required in the operation than is required in hand and button-set riveting, and skilled labor may be dispensed with; and also the time required to form the head is much less than in the other methods herein described as previously employed.

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

1. A rivet tool or set the operating-face of the cavity of which is formed at an angle of from ten to forty degrees with the axis of the cavity, substantially as and for the purpose specified.

2. A rivet tool or set the cavity of which is elongated, substantially as and for the purpose specified.

3. A rivet tool or set the operating-face of the cavity of which is formed at an angle of from ten to forty degrees with the axis of the cavity, having a further cavity the diameter of which equals the diameter of the shank of the rivet, substantially as and for the purpose specified.

In testimony whereof I have hereunto set my hand.

ANDREW F. CLINCH.

Witnesses:

G. W. BRILLINGER,
W. A. MILLER.