

UNITED STATES PATENT OFFICE.

GUSTAV E. SCHMIDT, OF CHICAGO, ILLINOIS.

SHEET-METAL WORK AND MEANS FOR MAKING SAME.

1,277,137.

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To all whom it may concern:

Be it known that I, GUSTAV E. SCHMIDT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sheet-Metal Work and Means for Making Same, of which the following is a specification.

My invention relates to improvements in sheet metal work and process and apparatus for producing same, and is of value where it is desired to prevent relative movement of a tubular member in a supporting frame or inclosure. My invention is capable of many applications, only one of which, however, will be described, viz., its use in connection with the manufacture of sheet metal parts entering into the construction of skates.

The salient objects of the invention are to provide a means of locking a tubular member axially into a supporting inclosure through the agency of parts formed out of the metal of the member itself; to provide a construction so organized that the formation of the locking parts results in a tight fitting engagement between the tubular member and the inclosing structure; to provide a construction such as may be applicable to tubular parts of non-circular cross-section or of non-uniform cross-section throughout the length of the tube; to provide a construction which may be produced rapidly and economically by approved shop methods and apparatus; and to provide an improved process and apparatus for producing such constructions.

In the drawings, which illustrate my invention as applied to the construction of sheet metal skate elements—

Figure 1 is a side elevation of a punch-and-die mechanism for securing together the plate and thimble of the sole support of a skate of ordinary type;

Fig. 2 is a plan view of the die shown in Fig. 1;

Fig. 3 is a vertical section through the punch-and-die shown in Fig. 1 showing the parts in the position occupied at the lowermost point of the stroke of the press;

Fig. 4 is a section taken on the line 4—4 of Fig. 3;

Fig. 5 is a section similar to Fig. 4 but showing the parts in the position when the punch commences its downward movement; and

Fig. 6 is a perspective view of the completed sole support.

Referring to the drawings, Fig. 6 represents the completed skate sole support which I have selected as illustrating a single application of my invention. In said sole support, 10 is the curved sole plate which is secured to the shoe of the wearer by rivets, screws, or similar means, and from the under side of said sole plate 10 and fixedly secured thereto projects the tapering tubular thimble part 11 constituting the connecting piece between the sole plate 10 and the longitudinal blade stiffener of the runner part of the skate. It may be stated that the runner is provided with a longitudinal tubular member shown in dotted lines for stiffening the blade and which is soldered or otherwise secured into the opening 12. Such stiffening member forms no part of my invention, and hence is not described.

Describing the detail construction of the sole support and referring particularly to Fig. 5, which shows the parts prior to their being secured together, it will be observed that the thimble part 11 is formed of a single piece of sheet metal in the form of a cone 13 having a flange 14 and a longitudinal seam 15, which may be of the type known as a stovepipe lock. Prior to the insertion of the thimble 13, the sole plate 10 is simply a flat blank 16 having a circular hole large enough to admit the cone 13 approximately half way.

Referring now to Figs. 3, 4, and 6, which show the completed article, it will be observed that the inner edge of the hole in the sole plate 10 has been flanged down, as shown at 17, while the thimble 13 has been pushed down into intimate engagement with said flange 17, the lower end of the parallel part 18 of the inner part 11 being formed into a circumferential bead-shape, as shown at 19, which interlocks beneath the lower edge of the flange-17 and so prevents axial movement of the cone 11 and sole plate 10.

Describing the apparatus for forming and securing together the two parts of the sole support, 20 is the body of a punch having the usual circular shank 21 for insertion in the head of an ordinary punch press. On the lower side of said punch body 20 I mount a pad 22 normally spaced apart from the punch body 20 by means of a set of com-

pression coil springs 23, said pad 22 being guided and limited in its movement relative to the body 20 by means of a plurality of headed studs 24, the lower ends of which are
5 screwed into the pad 22.

The spring pad 22 is bored out axially beneath the shank 21 of the punch so as to slide upon a central stem piece 25 fixed in the body 20. Said stem piece 25 is preferably
10 circular and carries on its lower end a slidably supported tip 26 made conical in shape to fit the lower end of the cone 13 of the thimble. It is understood that the tip 26 has formed in its surface a slight
15 shallow grooved recess to accommodate the seam 15 of the thimble (see Fig. 3). The tip 26 of the punch is not rigidly secured to the stem 25, but is normally forced outwardly therefrom, as shown at 27, by means
20 of a coil compression spring 28 inserted in a central bore 29 in the stem 25. Said spring 28 surrounds a longitudinal headed stud 30 inserted through the shank 21, and having its lower end screwed into a reduced portion
25 31 on the upper end of the tip 26 and which slides in the lower end of the bore 29. Rotation of the tip 26 relative to the stem piece 25 is prevented by means of a guide pin 32 fixed in the tip 26 and sliding in a
30 small hole 33 drilled in the stem piece 25.

The die part of the apparatus comprises the usual shoe or base 34 which is clamped to the bed of the press, said base having secured to its upper surface a hardened steel
35 die 35 having a cylindrical bore formed therein and extending down a short distance below the upper face of the die. Below said cylindrical bore formed in the die 35 is an aperture tapered and suitably shaped to fit
40 the upper portion of the conical lower end of the thimble 11. The flat blank from which the sole plate of the skate is formed is properly positioned by means of a set of four adjustable stops or gages 36, 37, 38,
45 and 39 which are secured to the upper face of the die by means of cap screws 40 passing through the slotted feet 41 of said gages.

Describing the operation of the apparatus, the head of the press when in its uppermost
50 position is spaced apart from the die a sufficient distance to permit the blank 16 to be laid within the gages on the top of the die while the previously formed cone 13 is applied to the tip 26 of the punch. Preferably,
55 the tip of the punch is formed with a lower extension 42 suitably shaped to hold the somewhat resilient thimble 13 when it is applied to the punch. The parts, having been properly located in position, the press
60 is tripped and the punch descends until the sides of the cone 13 strike against the circular edge of the hole formed in the blank 16 (see Fig. 5).

The spring pad 22 which, as shown in
65 Fig. 5, engages the flange 14 of the cone,

presses down the cone as the punch continues to descend, the springs 23 being sufficiently strong to hold the said spring pad spaced apart from the punch body 20 during such further forming movement of the
70 punch. When the outside of the cone strikes the edges of the hole in the blank 16, the latter becomes curved or bulged downwardly to fit the upper concave surface of the lower die 35. It is of course understood that un-
75 til the final spanking movement of the punch, the tip 26 is held spaced apart from the punch stem 25 by means of the spring 29.

Further downward movement of the punch results in the bending over of the
80 metal surrounding the hole in the blank to form a tubular flange 17, the formation of said flange 17 being completed when the outer surface of the cone strikes against and seats itself in the lower portion 43 of the
85 die. The downward movement of the lower part of the cone 13 is thus arrested. The spring pad 22, however, still continues to descend for a short distance until the final movement of the spring pad 22 results in
90 the outward buckling or bulging of the unsupported portion 19 of the cone immediately below the surrounding flange 17. It should of course be understood that prior to the said buckling operation, the stem 25
95 has forced its way into the upper part of the cone, thus forming therein a short cylindrical portion 18 engaging the surrounding flange 17. During the time that the stem 25 is thus forcing its way into the cone to
100 form the cylindrical portion 18, the spring 29 and the springs 23 are being collapsed so as to permit such independent movement of the stem 25.

The dimensions of the various parts are
105 such that the parts 22 and 20 come together before the downward movement of the flange 14 is arrested by the die 35, so that the full power of the press is available for collapsing the cone to form the bead-like
110 bulge 19. The stroke of the press is so adjusted that the final blow of the press is given with the parts 25 and 26 also brought together in contact with each other, so that in addition to the spanking of the flange 14
115 and plate 16, the cone 11 is also spanked and thus forced into the desired final shape.

During the upward movement of the press, the presser pad 22 has the usual additional
120 function of stripping the work from the punch, thereby facilitating the removal of the latter from the press to permit insertion of new parts.

The preceding description must in no
125 sense be construed as limiting the scope of the invention, which should be determined by reference to the appended claims.

I claim—

1. In sheet metal work, the combination
of a tubular member provided with an out- 130

wardly projecting flange at one end and a circumferentially extending outward bulge on the other end, and a perforated plate having a tubular flange inclosing the plate perforation surrounding and fitting said tube and interposed between said tube flange and said bulge.

2. In sheet metal work, the combination of a perforated plate having an integral down-turned tubular flange surrounding said perforation and a thimble provided with an outer flange overlying the plate on the side remote from said plate flange, a tubular intermediate portion fitting within and interlocked with said plate-flange against axial movement relative thereto, and a downwardly converging tapered extension.

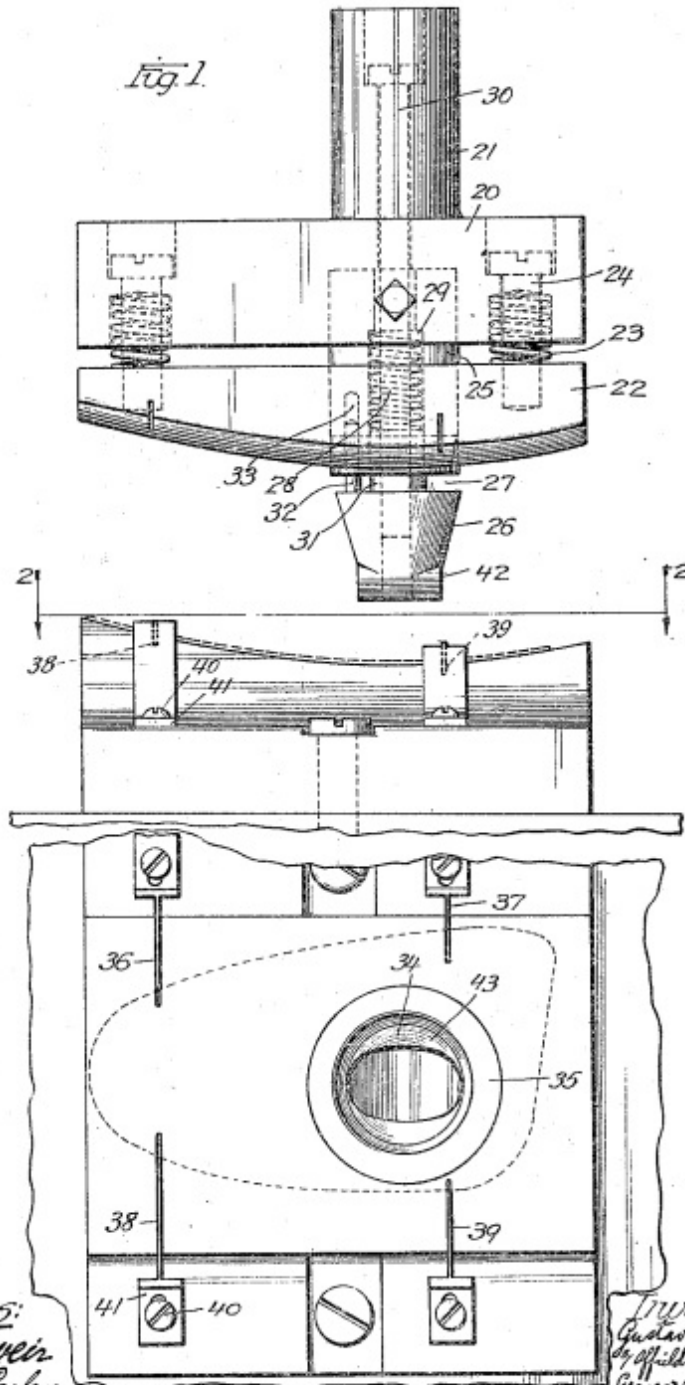
GUSTAV E. SCHMIDT.

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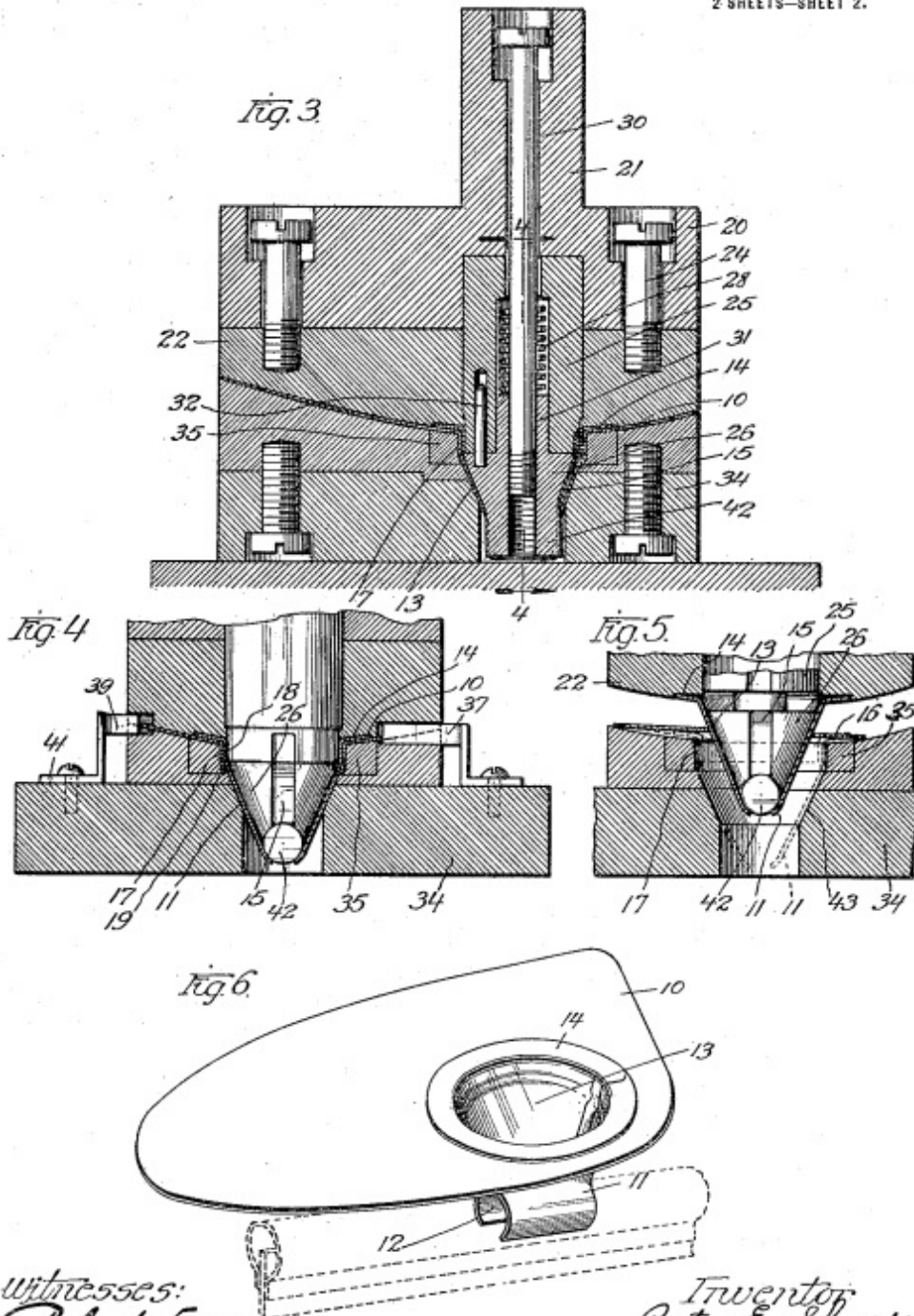
Witnesses:
Robert Steiner
Arthur W. Carlson

Inventor:
Gustav E. Schmidt
By *affid. Fowler*
Gerson Affildt

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Witnesses:
 Robert F. Weir
 Arthur W. Carlson

Inventor:
 Gustav E. Schmidt
 by Offield Towle
 Counselors & Attys.