(No Model.) 2 Sheets—Sheet 1.

S. A. LEONARD.

DIE FOR FORMING AUGERS.

No. 440,484. Patented Nov. 11, 1890.

FIG. 1.

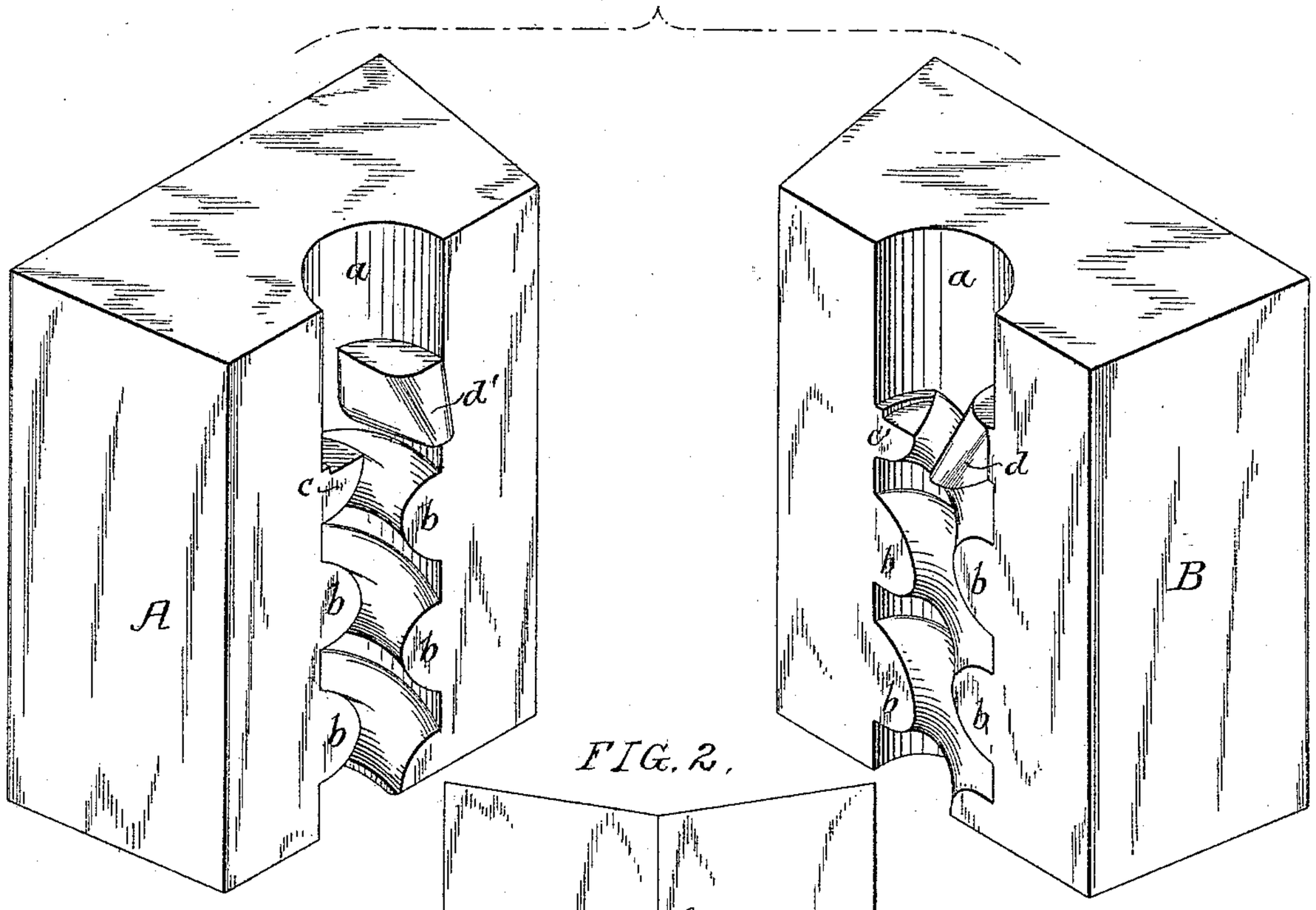


FIG. 2.

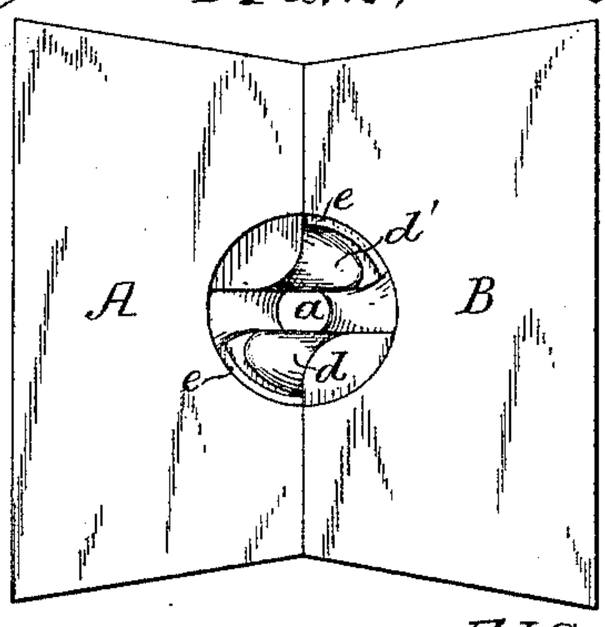


FIG. 3.

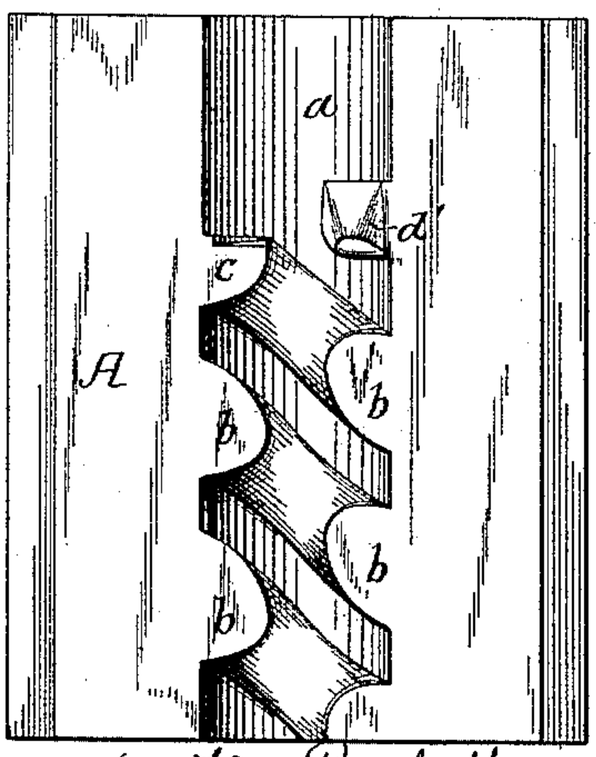


FIG. 4.

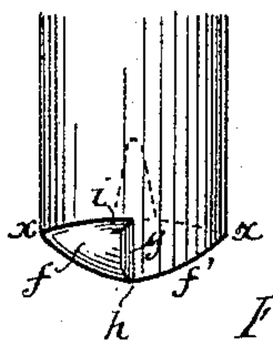


FIG. 5.

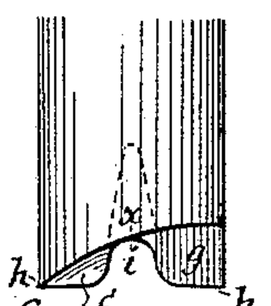
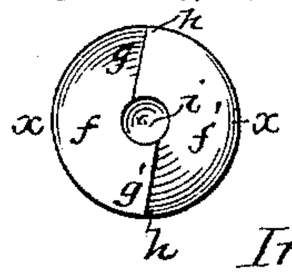


FIG. 6.



Witnesses { Alex Parkoff
R. Schleicher.

Inventor:
Seth A. Leonard
by his Attorneys
Howson & Howson

(No Model.) 2 Sheets—Sheet 2.

S. A. LEONARD.

DIE FOR FORMING AUGERS.

No. 440,484. Patented Nov. 11, 1890.

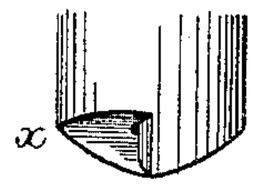
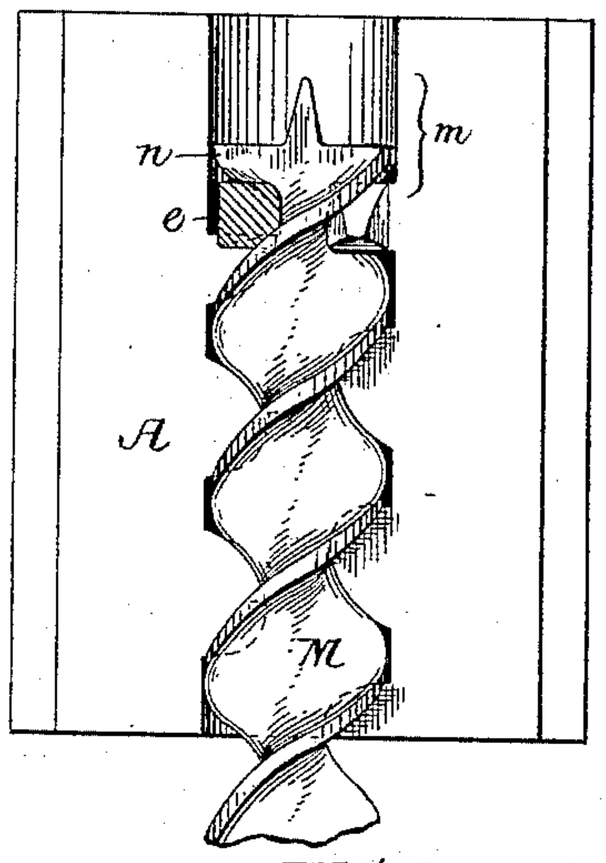


FIG. 7.



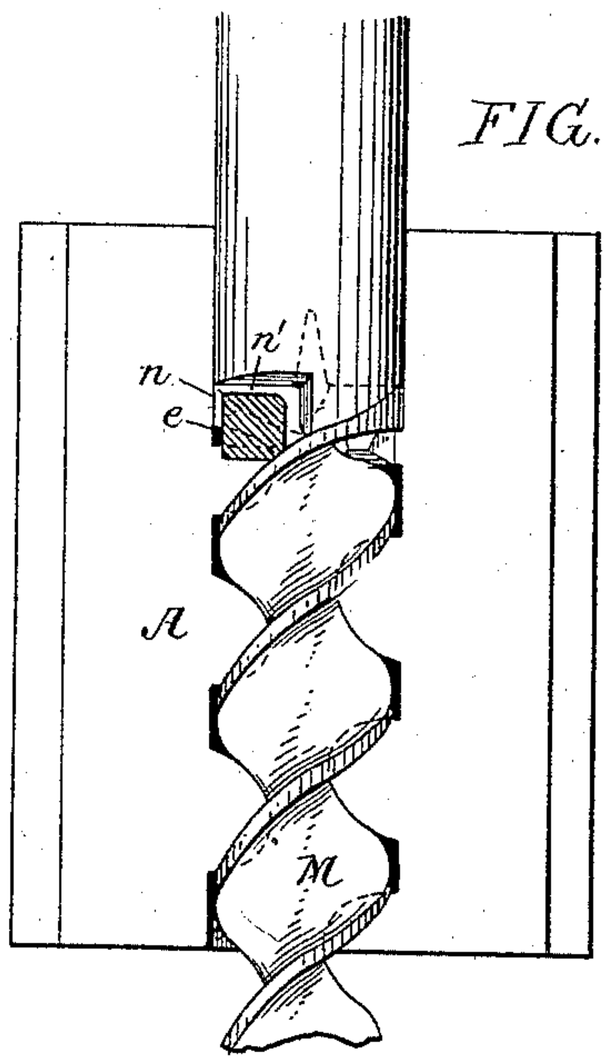


FIG. 8

FIG. 9.

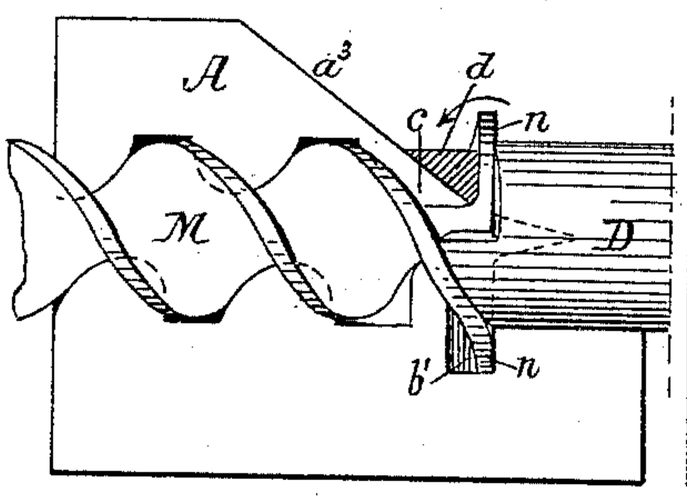


FIG. 11.

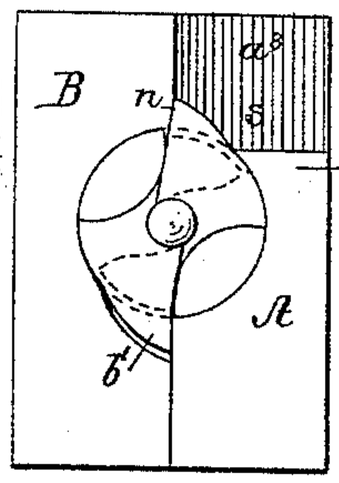
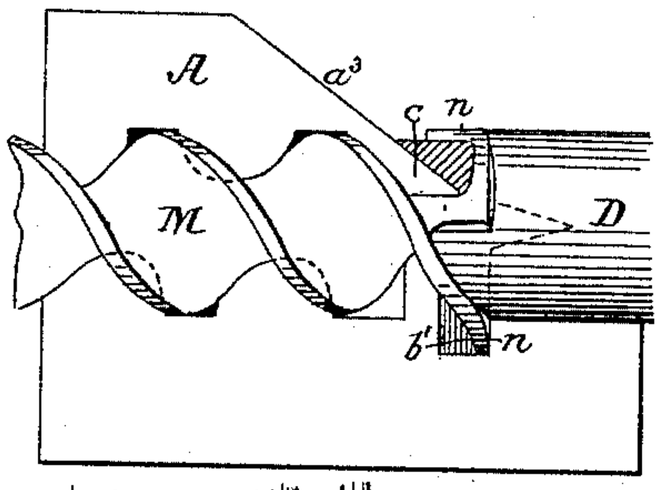


FIG. 10



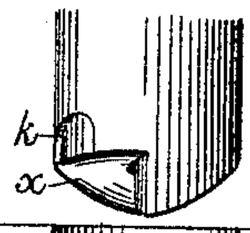


FIG. 14.

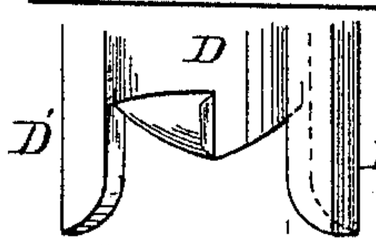


FIG. 12.

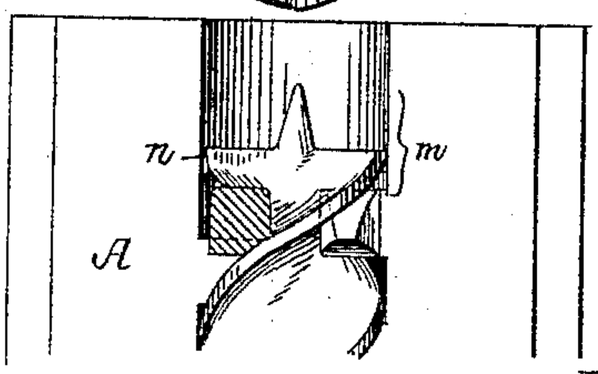


FIG. 16.

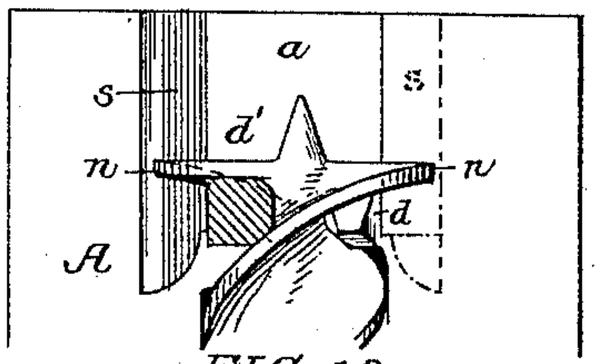


FIG. 13.

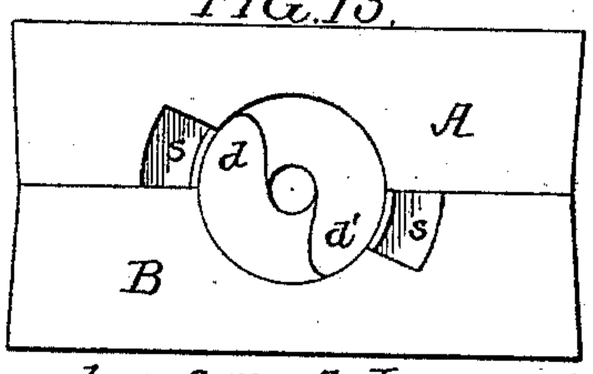
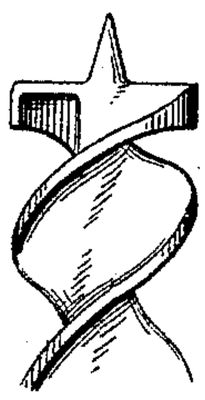
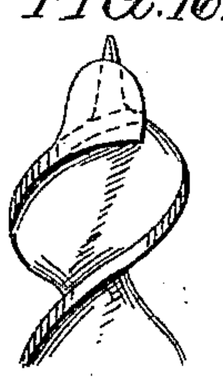


FIG. 15.





Witnesses:
Alex. Barkoff
R. Schleicher.

Inventor: Seth A. Leonard
by his Attorneys Howson & Howson

UNITED STATES PATENT OFFICE.

SETH A. LEONARD, OF PHILADELPHIA, PENNSYLVANIA.

DIE FOR FORMING AUGERS.

SPECIFICATION forming part of Letters Patent No. 440,484, dated November 11, 1890.

Application filed October 19, 1889. Serial No. 327,560. (No model.)

To all whom it may concern:

Be it known that I, SETH A. LEONARD, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Dies for Forming the Heads of Augers and Bits, of which the following is a specification.

The object of my invention is to so construct the dies used in forming the heads of augers and bits that a simple two-part die can be used with a plunger.

Heretofore it has been the general practice to finish the head of the auger with the under lip by hand, cutting out the portion bound by the cutting-edge and under lip, the dies merely forming a solid end, as it would be impossible in the ordinary construction of two-part dies to remove the formed auger after the under lip has been formed thereon. I overcome these difficulties in the following manner, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view showing the two dies separated. Fig. 2 is a plan view of the dies together. Fig. 3 is a face view of one of the dies. Figs. 4, 5, and 6 are views of the plunger. Figs. 7 and 8 are diagrams illustrating the formation of an under-lip auger or bit where power is used. Figs. 9, 10, and 11 are views illustrating the formation of the under-lip auger or bit by hand. Fig. 12 is a vertical section of a different form of die embodying my invention; Fig. 13, a plan view of the die shown. Fig. 14 is a diagram view showing the formation of the spur of the bit. Fig. 15 is a side view of the head of an under-lip auger, and Fig. 16 is a side view of the head of a spur-bit.

Referring to Figs. 1, 2, and 3, A and B are the two dies forming the two-part mold. These dies have each a semicircular orifice *a*, and in these orifices are raised spiral ribs *b*, one half of the spiral being in one die and the other in the other die.

The die A has a seat *c*, preferably cut beveled, as shown in Fig. 3, and adapted to this seat is the projecting anvil-horn *d* of the die B. This horn projects into the die A and is supported by the seat *c*, so that when pressure is applied to force the metal forming the under lip of the auger over this anvil-horn the seat *c* will sustain the thrust and will prevent the horn from breaking.

On the side of the die A opposite to the seat *c* is a horn *d'*, similar in form to and in fact a duplicate of the horn *d* of the die B. This horn extends into the die B, and is supported by the seat *c*, (clearly shown in Fig. 1,) and the lip opposite to that turned over the anvil-horn *d* is turned over this anvil-horn *d'*. When the two dies are together, as shown in Figs. 2, 6, and 7, a space *e* is formed between each of the horns *d d'* and the dies A and B, and in the space *e* are forced by pressure the under lips of the auger.

If the anvil-horn *d*, instead of projecting from the die B, as shown, formed a permanent part of the die A, the space *e* would be formed, but when the auger was struck up in said die so as to form an under lip it could not be removed therefrom, as the auger, owing to its peculiar shape, has to be removed outward from the face of the die, it being confined longitudinally, so that any lip or projection—such as the under lip—would prevent the removal of the auger, and it is to overcome this objection that I form an anvil-horn on each die and allow it to extend into the other die, as shown.

In Figs. 4, 5, and 6 I have shown the plunger used in connection with the dies to force the prepared bit into the proper shape, as shown in the diagrams in Figs. 7 and 8. This plunger D has two inclined faces *f f'* of an incline corresponding to that of the twist of the finished bit, and also has two vertical edges *g g'* and an orifice *i* for the formation of the point of the bit. The plunger is so mounted in respect to the dies that the points *h* are at right angles to the parting-line of the dies. Previous to my invention these points were on the same line as the parting-line of the dies, and consequently when the old style solid-head bit was formed the metal was crowded into the corner of the plunger formed by the vertical faces and inclined faces to such a degree that these corners of the plunger would invariably break off and become useless, but by so setting the plunger in respect to the dies that the thrust is taken on the portion *x x* of the die and the lateral flow of metal is not checked by any projection

this continual breaking of the plunger is prevented.

I have illustrated by two diagrams, Figs. 7 and 8, the formation of an under-lip auger. The auger-blank M is placed in the dies, as shown in Fig. 7, the head *m* of the blank M being cut into the shape shown in Fig. 7, and the plunger is in the position indicated, so that on the depression of said plunger the metal of the head *m* of the bit will assume the shape shown in Fig. 8, the portion *n* forming the under lip and the portion *n'* the cutting-edge, and the point is rounded and shaped as it passes into the orifice *i* of the plunger, so that the bit is finished as far as the rough work is concerned by the simple pressure of the plunger. As will be noted in said figure, the under lips *n* are bent over the anvil-horns *d d'*, so that it will be impossible to form on the two-part die these under lips without the projecting anvil-horns.

To form a spur-bit or extension cutting-edge on a bit, the plunger is cut out at *k*, Fig. 14. The metal as it is compressed will flow into this space *k* and form a spur, as shown at *m'*, Fig. 16.

A different form of blank may be used from that shown in Figs. 7 and 8 for making the auger or bit—as, for instance, a blank may be used as shown in Figs. 9 and 12, the portion *n'*, which will form the under lip, extending beyond the peripheral line of the auger-blank, and by cutting passages *s s* in the dies A B at the points indicated in Fig. 13 and securing to the plunger D arms D', preferably with rounded ends, which are adapted to these passages *s s*. The blank can be placed in the die, as shown in Fig. 12, with the projecting portion *n* in the space *s*, so that on the depression of the die D with the arms D' the arms will bend over the portions *n*, forming the under lip of the auger over the anvil-horns *d d'*, the die shaping the head and point of the auger.

Where it is impossible to use powerful pressure that would be necessarily employed in forming the head of the auger or bit, I form the dies as shown in Figs. 9, 10, and 11. The die A, instead of being situated vertically, as preferred in the other form of die illustrated, I mount preferably horizontally, and use the plunger D to shape the head of the blank M, which is of the shape shown in Fig. 9, that the end *n* projects beyond the peripheral line of the blank.

The die A, instead of extending as shown in Fig. 1, is cut away, forming a recess *s*, the die B forming one side of said recess and the portions a^2 a^3 forming the other sides.

The horn *d* projects into the die A substantially in the manner shown in the figure above alluded to; but instead of turning both lips of the auger simultaneously one lip is turned at a time, the horn *d'* being merely used as a supporting-horn in this instance, and may in some instances be dispensed with.

A cavity *b'* in the die is of such a shape as to receive the lip or extension *n* before and after it is bent. When the blank is placed in the dies, as shown in Fig. 9, and the plunger driven to the position shown, the operator turns the portion *n* over onto the anvil-horn by means of a hammer or other suitable tool, and forms by this manipulation the under lip. The dies are then parted, the blank turned so as to present the other extension *n*, and the blank is again clamped. The dies are then closed and the plunger forced to its seat, and the lip will be turned in the same manner as the opposite lip.

A spur may be formed by cutting out the portion *k* in the plunger and turning the lip up instead of down; or by a vertical pressure both the spur and the lip may be formed as shown in Fig. 16.

In every case the anvil-horn is used, whether the lip is forced over the anvil by the plunger, as shown in Figs. 7 and 8, or whether forced by arms, (shown in Figs. 12 and 13,) or by hand manipulation, as shown in Figs. 9, 10, and 11.

I claim as my invention—

1. In dies for forming the heads of augers or bits, one of said dies having a projecting anvil-horn and the opposite die having a recess adapted to receive said horn, said horn being of such shape that the under lip of an auger or bit can be formed thereon in said die, substantially as described.

2. The combination of the dies A and B, one of said dies having an anvil-horn *d* and the other die having a seat *c*, adapted to support said horn, with a plunger adapted to pass into the dies and act upon the head of an auger-blank to form the under lip thereon, substantially as described.

3. The combination of the die A, with its projecting anvil-horn *d'* and its seat *c*, with the die B, an anvil-horn *d* thereon and a seat *c*, the horn of one eye being adapted to pass into a recess upon the side of the opposite die, with a plunger having a beveled face adapted to outline the head of the auger or bit, substantially as described.

4. The combination of the two-part dies A and B, with the anvil-horns thereon, with a plunger having the corners *h h* at an angle to the parting-line of the dies, so that the metal of the blank being compressed will be free to flow laterally in respect to the blank, substantially as described.

5. The combination of the dies A and B and a projecting anvil-horn on each die with a plunger D, adapted to force the metal of the auger-blank over the anvil-horns forming the under lip, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SETH A. LEONARD.

Witnesses:
M. B. DWIGHT,
HENRY HOWSON.