United States Patent

Robinson, Jr.

[15] **3,683,499**

[45] **Aug. 15, 1972**

[54] **UNITARY PIERCING PUNCH DEVICE**

[72] Inventor: **Arthur H. Robinson, Jr.**, Somerville, N.J.

[73] Assignee: **Makrite, Inc.**, Middlesex, N.J.

[22] Filed: **Aug. 7, 1970**

[21] Appl. No.: **62,059**

[52] **U.S. Cl.** **30/360**

[51] **Int. Cl.** **B26f 1/00**

[58] **Field of Search** 30/358, 360, 361, 366, 367

[56] **References Cited**

UNITED STATES PATENTS

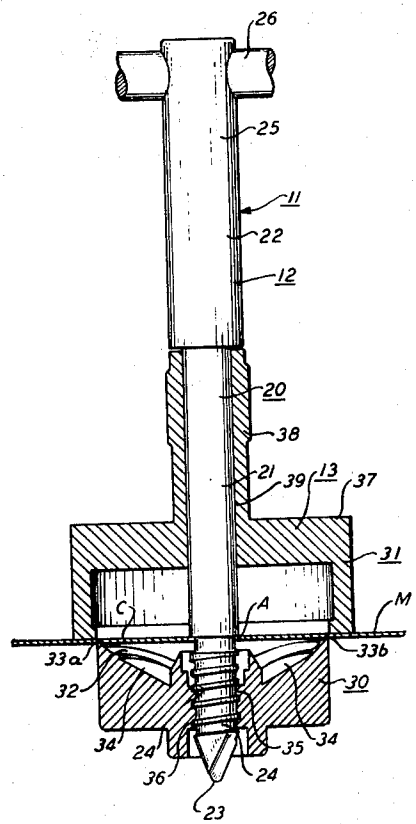
1,540,860	6/1925	Pobanz	30/360 X
2,145,725	1/1939	Jamieson	30/360 X
2,202,513	5/1940	Benner	30/361
3,105,299	10/1963	Wirtanen	30/360

Primary Examiner—Theron E. Condon
Assistant Examiner—J. C. Peters
Attorney—Sommers & Sommers

[57] **ABSTRACT**

A unitary piercing punch device, adapted to provide piercing and aperture cutout operations on a length of material such as a formed metal sheet, and which further provides for retention of the cutout slug in the punch on disassociation of the elements to enable simplified removal thereof.

2 Claims, 5 Drawing Figures



Patented Aug. 15, 1972 3,683,499

2 Sheets-Sheet 1

FIG. 1

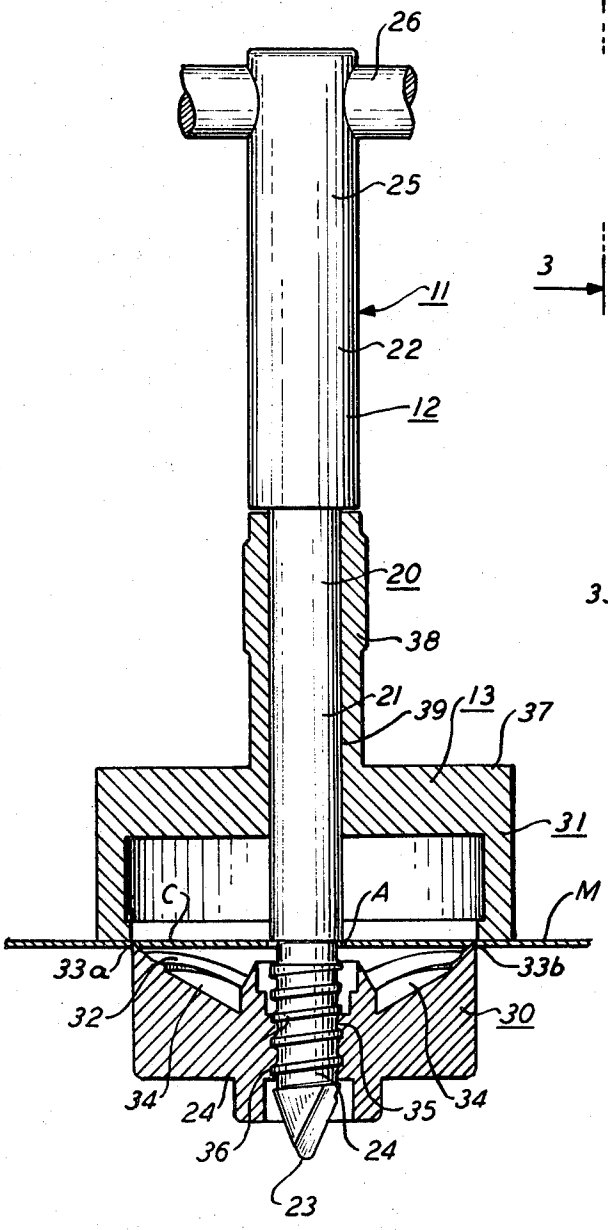


FIG. 2

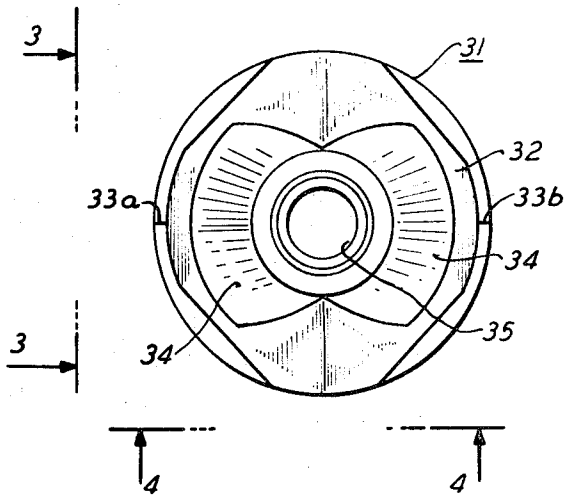


FIG. 3

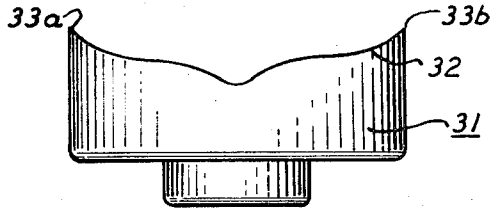
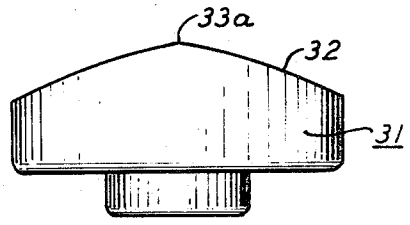


FIG. 4



INVENTOR.
ARTHUR H. ROBINSON, JR.

BY

Sommers & Sommers
ATTORNEYS

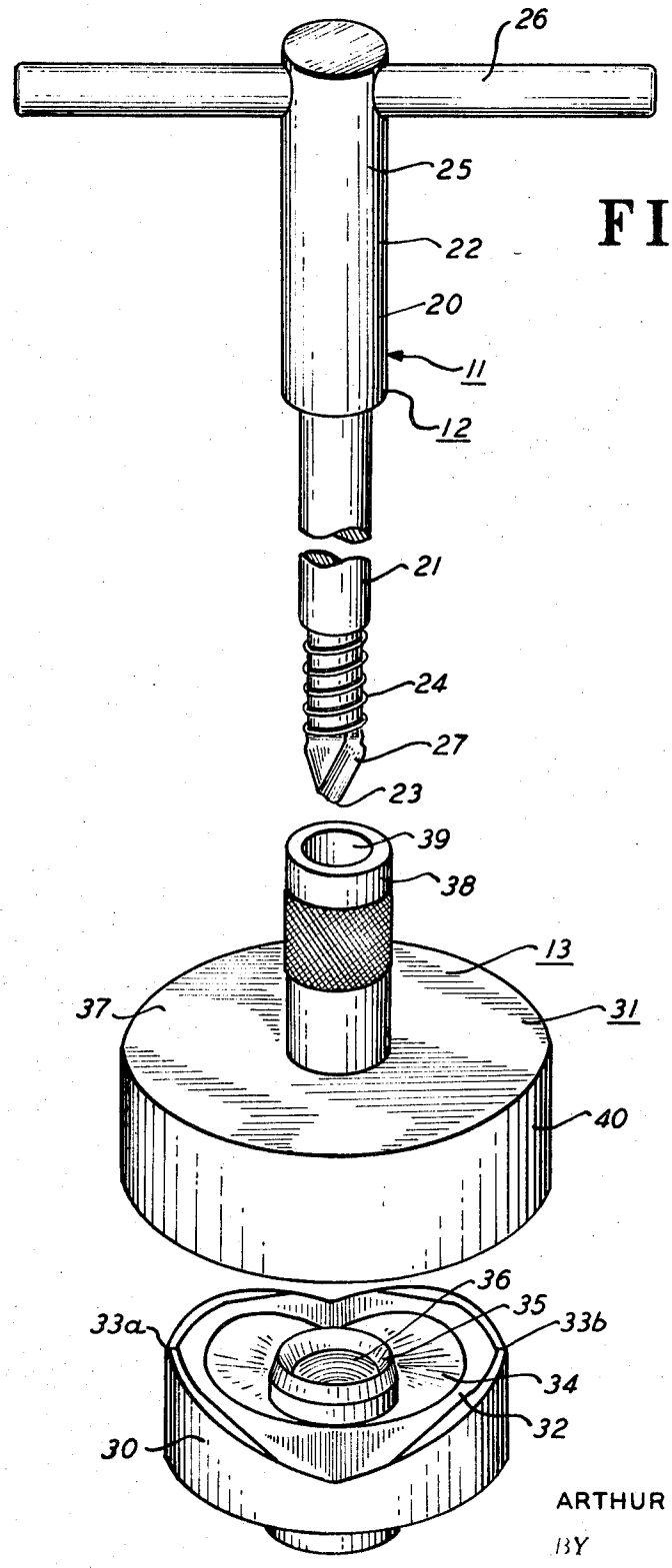


FIG. 5

INVENTOR.
ARTHUR H. ROBINSON, JR.
BY
Sommers & Sommers
ATTORNEYS

UNITARY PIERCING PUNCH DEVICE

BACKGROUND OF INVENTION

This invention relates generally to punch aperture-forming devices, and more specifically relates to a unitary piercing punch device which provides a unitary construction for piercing a formed length of sheet metal or other similar material and coordinated therewith formation of an aperture cutout by interaction of the members thereof, which cutout is retained in the punch members thereof to enable simplified removal on disassociation.

Pursuant to the invention, the unitary piercing punch device may be operated conveniently and efficiently, to enable a unitary operation on a length of material such as a formed length of sheet metal to provide efficient aperture cutout formation therein.

In accordance with the foregoing, it may be regarded as among the objects of the present invention to provide a novel unitary device for coordinated operation on a length of sheet material to initiate piercing and to provide cooperating aperture cutout formation therein, to be utilized for example in forming a downspout aperture in a length of roof gutter for insertion of a downspout cup therein.

Now in accordance with the present invention, the foregoing objects and others as will become apparent in the course of the ensuing specification are achieved through use of a unitary piercing punch device operable, as will be described below, so that piercing of the length of material is initiated thereby and in a cooperating operation forms an aperture cutout therein which is retained for simplified removal thereof.

BRIEF DESCRIPTION OF DRAWINGS

The invention is diagrammatically illustrated, by way of example, in the appended drawings, in which:

FIG. 1 is an elevational, partly cross-sectional view of the unitary piercing punch device embodying the invention, shown in operation on a sheet of material;

FIG. 2 is a top plan view of the punch member, pursuant to the invention;

FIG. 3 is a side elevational view of the punch member taken on line 3—3 of FIG. 2;

FIG. 4 is a side elevational view of the punch member taken on line 4—4 of FIG. 2; and

FIG. 5 is an exploded view of the unitary piercing punch device of the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

In accordance with the preferred mode of practicing the invention, the unitary piercing punch device **11** (FIGS. 1 and 5) for example, comprises a handle piercing member **12** and cooperating punch means **13**, which are shown operating on a sheet of material M in FIG. 1, as in formation of a sheet metal cutout in a length of gutter for insertion of a downspout cup therein. The handle piercing member **12** (FIGS. 1 and 5), for example comprises a longitudinal shaft **20** which consists of a lower shaft portion **21** thereof which is of generally smaller diameter than upper shaft portion **22** thereof, said lower shaft portion **21** comprising a piercing tip **23** on the lowermost end thereof and a threaded portion **24** extending thereabove for a portion of the length of said lower shaft portion, with a cutting edge

27 extending generally between said piercing tip **23** and the threaded portion **24**, said upper shaft portion **22** comprising a handle portion **25** on the upper portion thereof with extending arm portions **26** projecting therefrom.

The cooperating punch means **13** comprises, for example, a punch member **30** and die member **31**. The punch member **30** (FIGS. 1–5) comprises a generally cup shaped member with an arcuate cutting edge **32** in the upper interior portion thereof which has projecting cutting tips **33a**, **33b** at opposing tip portions thereof, and further comprises recess portions **34** and a central bore **35** extending therethrough with interior threads **36** which co-operate with the threaded portion **24** of said handle piercing member **12**. The die member **31** (FIGS. 1 and 5) comprises an inverted cup shaped cooperating member **37** with an extending top portion **38** and a central bore **39** extending therethrough for guidance and retention of said handle piercing member **12** therein.

In operation (FIG. 1), for example, the handle piercing member **12** is placed centrally at the point where the aperture cutout center is to be located on the sheet of material. Rotational force is then applied to the handle portion **25** thereof by movement of the extending arm portions **26** or otherwise, to thereby initiate formation of the aperture A; upon initiation of the aperture the handle may be removed and placed in the die member central bore **39** and the two members may then be placed over the aperture A with the piercing tip **23** inserted therein. Upon further application of rotational force to the handle piercing member **12**, the cutting edge **27** shapes a larger and larger aperture A to the point where the aperture A is of diameter sufficient for the threaded portion **24** to move therethrough; upon further rotational force applied the threaded portion projects through the material M to a point where such extension is sufficient to enable interaction with the interior threads **36** of punch member **30**, at which point the punch member **30** is threaded to the handle member **12**; rotational force is then applied to the punch member **30** with the handle piercing member **12** being held fixed to enable piercing by the projecting cutting tips **33*a***, **33*b*** of the punch member, and further cutout operation upon further rotation is provided by the cutting edge **32** thereof, until the completed aperture cutout C has been formed in the material M. Upon further rotation of the handle member, the smooth handle portion immediately above the threaded portion **24** projects through the aperture A and is of a slightly larger diameter than the threads thereof; thereupon, reverse rotational force applied to the handle portion **25** enables the smooth movement through the aperture A of the lower shaft portion **21** and once said portion is disengaged from the interior threads **36** of the punch member **30**, the handle piercing member **12** can be easily removed from the die member **31** and the aperture cutout C will be retained in the interior recess portions **34** of the punch **30**, such that it can be easily removed from the punch member on disassociation thereof.

By virtue of the unitary construction of the piercing punch device of this invention, the operator can, with a single unit, initiate the aperture cut and form the complete cutout in a simplified and efficient operation

conveniently and without the necessity for external initiating steps and thereby assure the accuracy of the device by virtue thereof.

While the present invention has been particularly set forth in terms of specific embodiments thereof, it will be evident in view of the instant disclosure, that numerous variations upon the invention are now enabled to those skilled in the art, which variations in propriety are yet within the true scope of this teaching. Accordingly, the invention is to be broadly construed, and limited only by the scope and spirit of the claims now appended hereto.

I claim:

1. A unitary piercing punch device, for coordinated piercing of a sheet of metal and forming of an aperture cutout therein, comprising:

a. a handle piercing member, for piercing said metal and initiating aperture cutout operations,

b. cooperating punch means, for formation of the aperture cutout in said metal sheet in cooperation with said handle piercing member,

c. said cooperating punch means comprising a punch member, with an arcuate cutting edge, and cooperating die handle guide member, interacting to form said metal cutout and further providing guidance for said handle piercing member, and

d. said handle piercing member comprising a longitudinal shaft having an upper shaft portion, a piercing tip, and a cutting edge extending above said piercing tip.

2. In a unitary piercing punch device as described in claim 1, said punch member comprising a cup shaped member with said a arcuate cutting edge having cutting tips at opposing tip portions thereof, and recess portions in the interior top portion thereof, and a central bore extending therethrough with interior threads which cooperate with threaded portions on said handle piercing member.

* * * * *