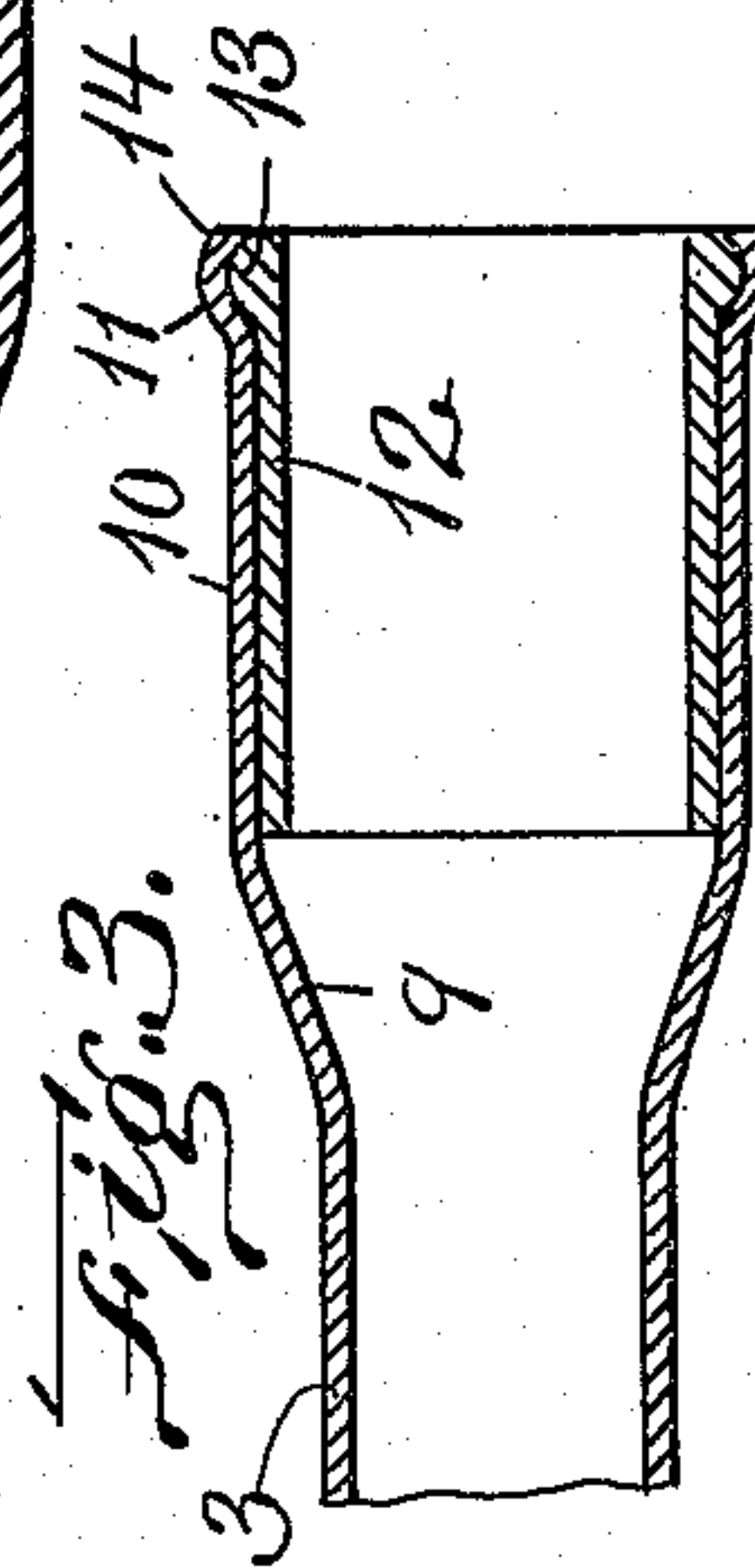
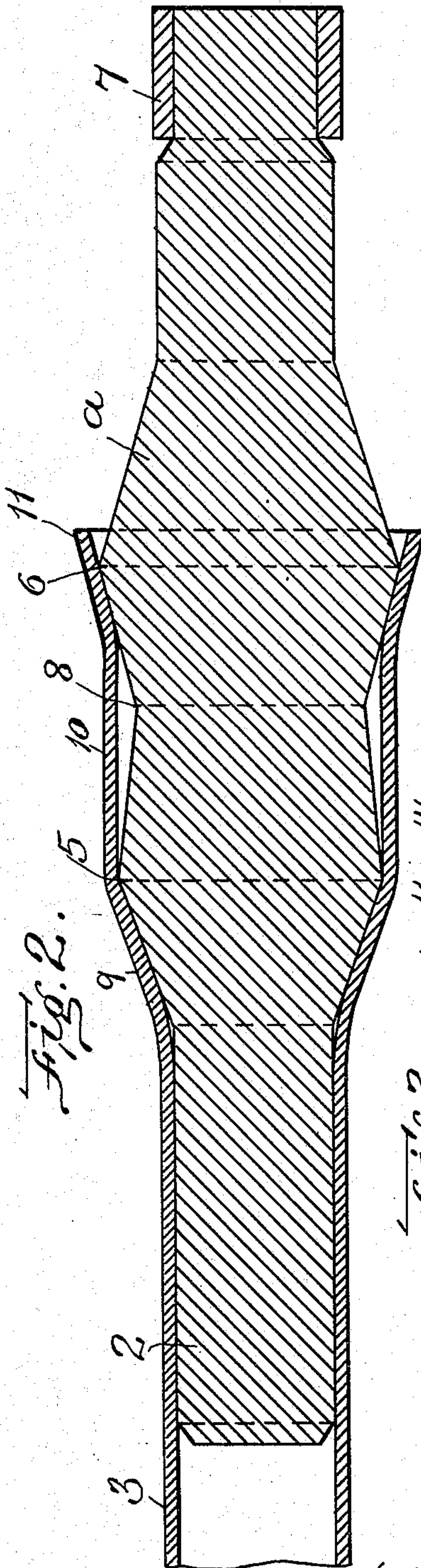
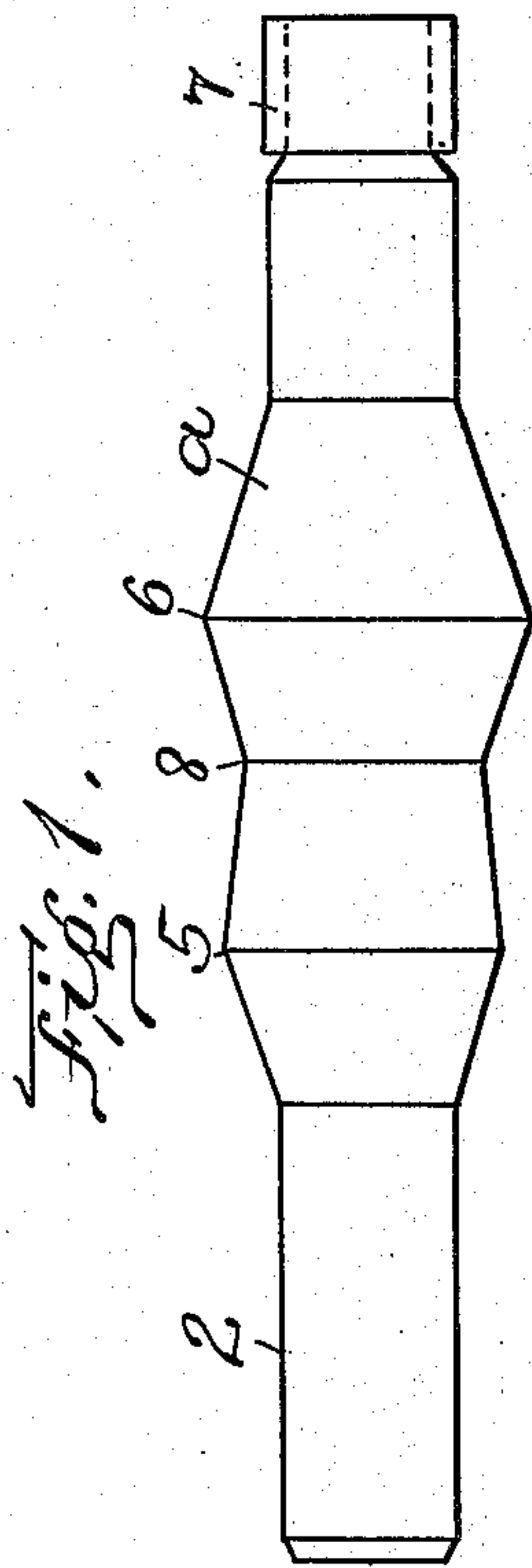


E. F. WARDWELL.
 PIPE EXPANDING TOOL.
 APPLICATION FILED MAY 13, 1909.

936,838.

Patented Oct. 12, 1909.



Witnesses.
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UNITED STATES PATENT OFFICE.

EDWARD F. WARDWELL, OF WOODSTOCK, VERMONT.

PIPE-EXPANDING TOOL.

936,838.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed May 13, 1909. Serial No. 495,658.

To all whom it may concern:

Be it known that I, EDWARD F. WARDWELL, of Woodstock, in the county of Windsor and State of Vermont, have invented certain new and useful Improvements in Pipe-Expanding Tools, of which the following is a specification.

This invention relates to an expanding tool adapted to be driven into one end of a length of lead pipe to expand the same and form an enlarged end portion adapted to receive a hard metal ferrule, the internal diameter of which may be somewhat larger than the internal diameter of the body or unexpanded portion of the pipe, said ferrule supporting the enlarged end of the pipe against the compressive action of caulking or packing material employed to secure the enlarged end within the bell mouth of a hard metal pipe or fitting.

The invention has for its object to provide an expanding tool adapted to form an enlarged end portion of considerable length on a lead pipe, without causing a binding engagement between the expanding tool and the pipe, and without liability of cracking the expanded portion of the pipe, another object being to impart to the outer end of the enlarged portion a mouth adapted to be readily upset over a part of the outer portion of the ferrule.

The invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification,—Figure 1 represents a side elevation of an expanding tool embodying my invention. Fig. 2 represents a longitudinal section of the same, and a longitudinal section of a portion of a lead pipe which has been expanded by the tool. Fig. 3 represents a sectional view of the expanded portion of the pipe, and a ferrule engaged therewith.

The same reference characters indicate the same parts in all the figures.

In the drawings,—a represents my improved expanding tool which is an elongated rod or mandrel, preferably made of hard wood, although any other suitable material may be employed, having a cylindrical end portion 2 adapted to be inserted with an easy fit in one end of an unexpanded lead pipe 3. The tool is provided with a series of peripheral ridges which are concentric with the end portion 2, and with the longi-

tudinal axis of the tool, said series including a relatively small inner ridge 5 adjoining the entering portion 2, and a relatively large outer ridge 6, the size or diameter of which is greater than that of the ridge 5. Each of said ridges has oppositely inclined inner and outer faces, the inner faces being inclined inwardly from the outer end of the tool to which the driving ferrule 7 is attached, toward the inner end of the tool formed by the entering portion 2, the formation being such that when the tool is driven into the pipe 3, each ridge will exert a gentle expanding force on the interior of the pipe, the initial expansion caused by the inner ridge 5 being increased by the outer ridge 6.

The expanding portion of the tool is reduced in diameter between the inner ridge 5 and the outer ridge 6, this reduction in the embodiment of my invention here shown being due to the fact that the outer face of the ridge 5 has a taper which is opposite to the taper of the inner faces of both ridges, the outer face of the inner ridge and the inner face of the outer ridge meeting and forming a neck portion 8 which is of smaller diameter than the inner ridge 5. The object of the reduction of this portion of the periphery of the tool is to afford clearance for the portion of the tube which has been enlarged by the inner ridge 5.

It will be seen by an inspection of Fig. 2 that each ridge has a narrow zone of contact with the internal surface of the pipe formed by its tapered inner face and apex, so that the tool is adapted to slide freely on the expanded portion of the pipe. The portion of the pipe expanded by the ridge 5 contacts only with a portion of the tapered inner face of the outer ridge 6, the reduced portion of the tool between the ridges 5 and 6 providing sufficient clearance to enable the tool to complete the expansion of the end of the pipe with the minimum of frictional resistance, and without causing the tool to bind or stick in the expanded portion of the pipe.

In practice, the portion of the pipe expanded by the ridges 5 and 6 forms a tapering portion 9, and a substantially cylindrical portion 10 terminating in a flaring mouth 11 which is formed by the contact of the tapering inner side of the outer ridge with the interior of the expanded portion 10. Owing to the fact that the taper from the ridge 5 toward the end portion 2 is short

and rather abrupt, the action of the tool when driven into the pipe, sufficiently upsets or shortens the portion of the pipe through which it is being driven, to practically preserve the original thickness of the walls of the expanded portion. And the length of the end portion 2 is such as to hold and guide the tool during the driving in operation and to preserve the shape of the portion of the pipe which is adjacent to the portion which is being upset and expanded.

The cylindrical portion 10 is adapted to receive the body of a tubular hard metal ferrule 12, preferably made of cast iron, said ferrule having a peripheral protuberance or ridge 13 at its outer end provided with oppositely tapered sides. The interior of the mouth 11, as formed by the tool, abuts against the inner side of the ferrule ridge 13 so that the ferrule may be interlocked with the pipe by forcing inwardly the extreme end portion of the expanded mouth 11 to form a lip 14 bearing on the outer inclined side of the ferrule ridge 13.

The described formation of the expanding tool, including the reduced clearance portion 8, not only enables the tool to be driven into the pipe to give the same the formation shown and described, without sticking or binding in the pipe, but also without liability of splitting or cracking the pipe, and without materially reducing the thickness of the expanded portion at any one

part, the expanded portion being of practically uniform thickness at all parts.

The ferrule 7 is employed when the tool is made of wood or any material liable to be injured by a mallet or other driving instrument which forces it into the pipe.

I claim:

A pipe-expanding and upsetting tool composed of an elongated body having an entering end portion adapted to fit the interior of the pipe to be expanded and of a length to guide the tool while being driven in, and an expanding portion comprising a series of peripheral ridges concentric with the end portion and of successively increasing diameter, the series comprising a relatively small inner ridge adjoining the entering portion, and a relatively large outer ridge, the faces forming the inner sides of said ridges being tapered inwardly toward the entering portion, and the face forming the outer side of the inner ridge being reduced to provide clearance for the portion of the pipe enlarged by the inner ridge, the face forming the inner side of the inner ridge being sufficiently abrupt to shorten or upset the portion of the pipe which is being expanded.

In testimony whereof I have affixed my signature, in presence of two witnesses.

EDWARD F. WARDWELL.

Witnesses:

JAS. H. CHURCHILL,
C. F. BROWN.