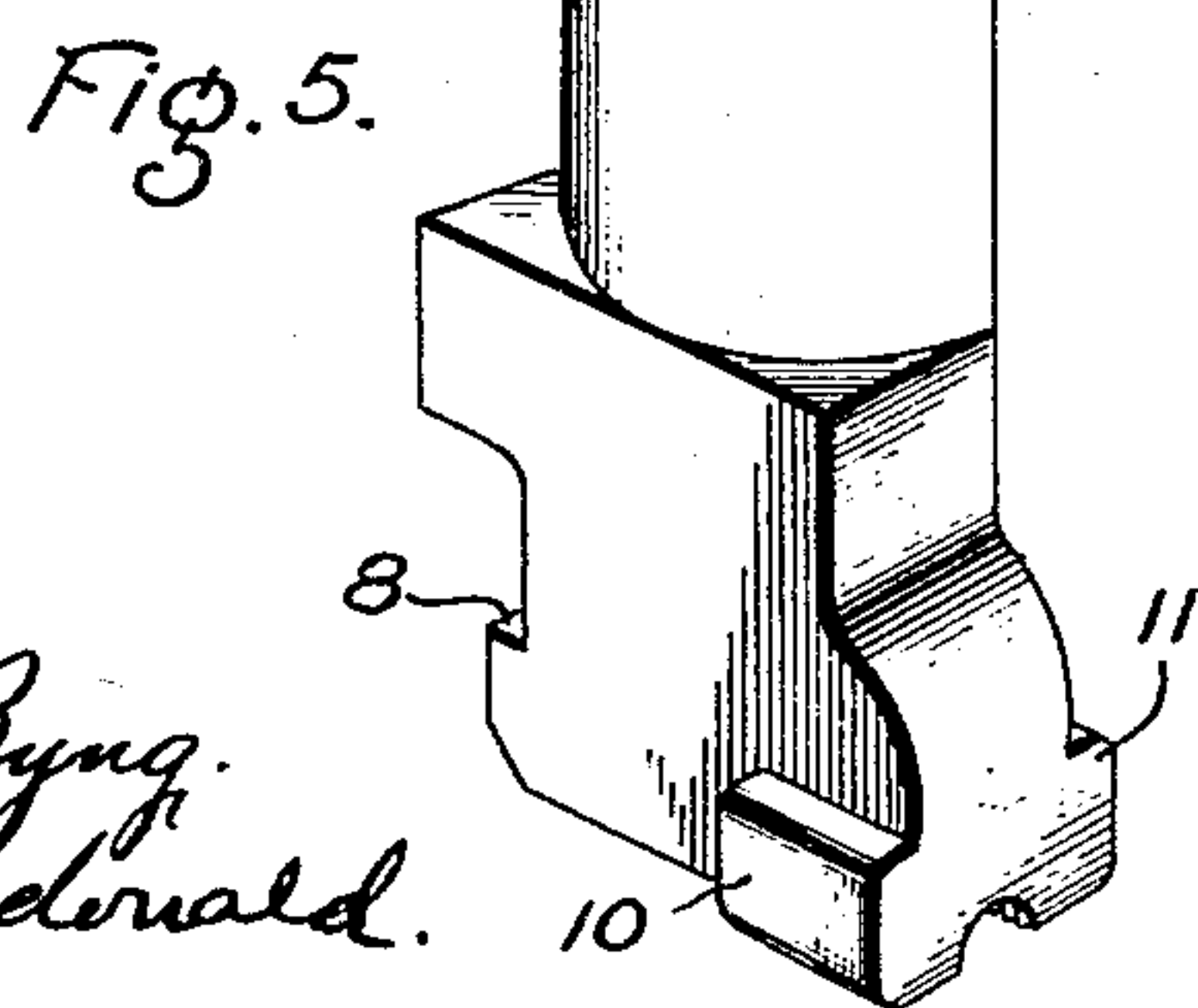
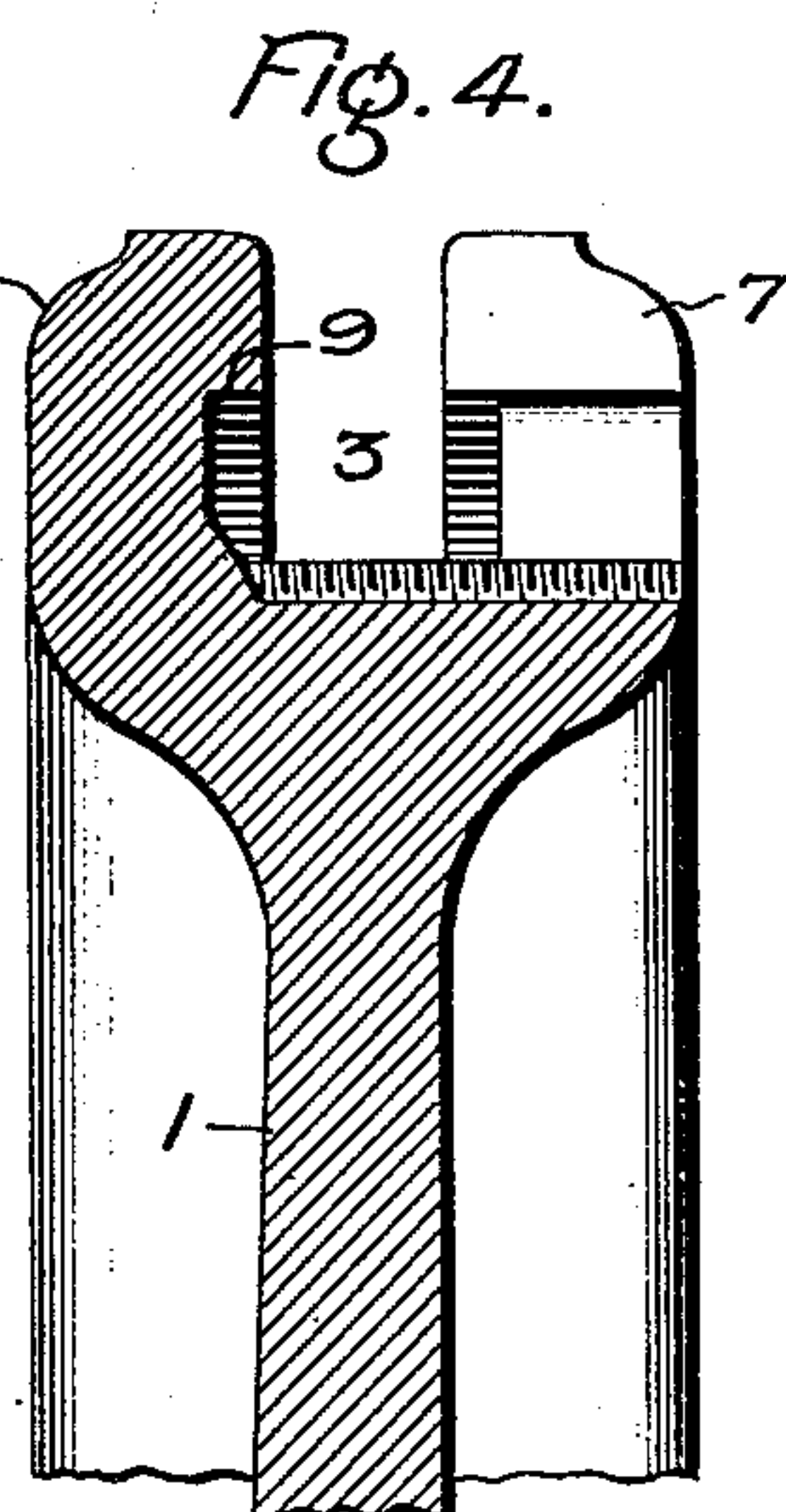
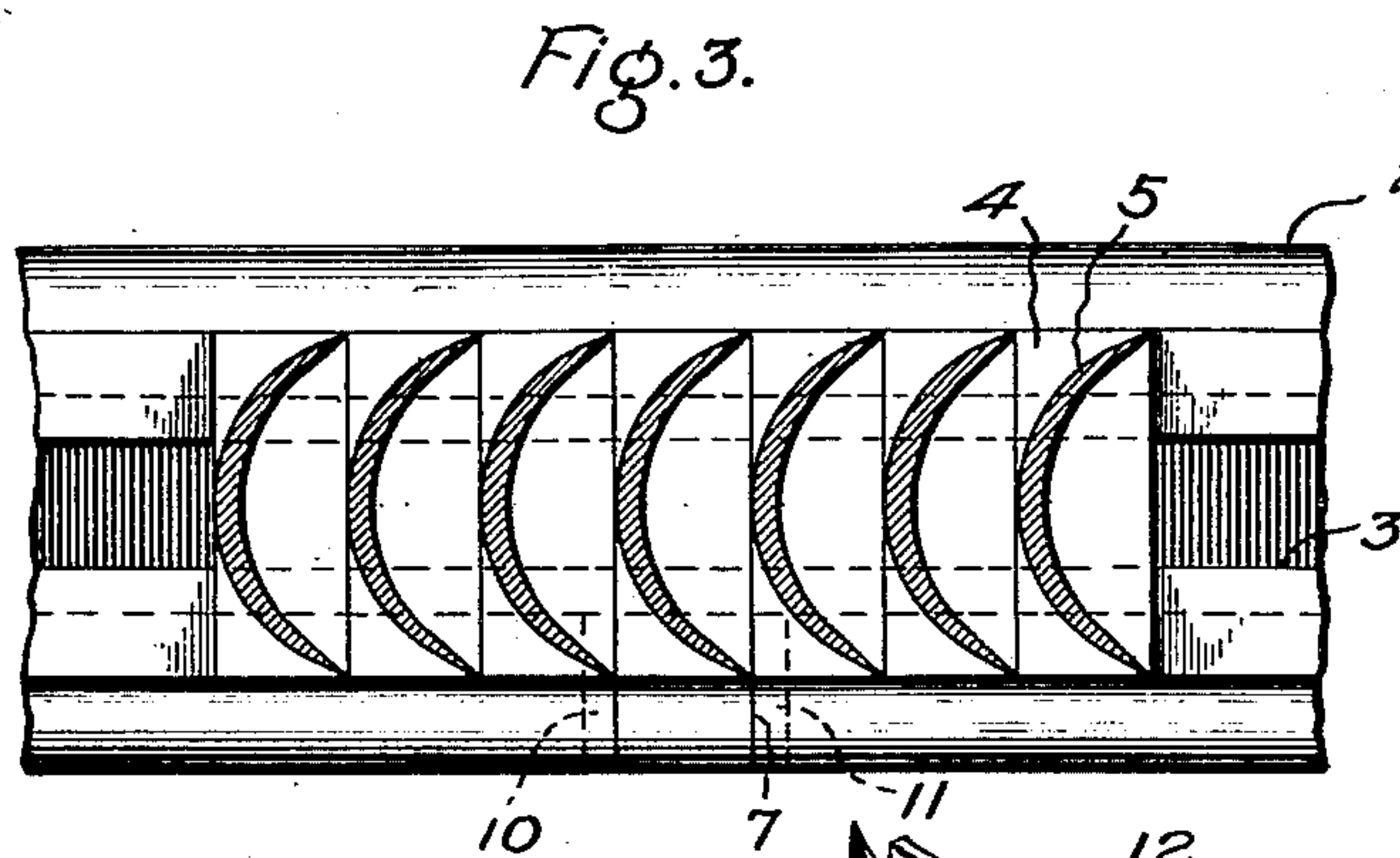
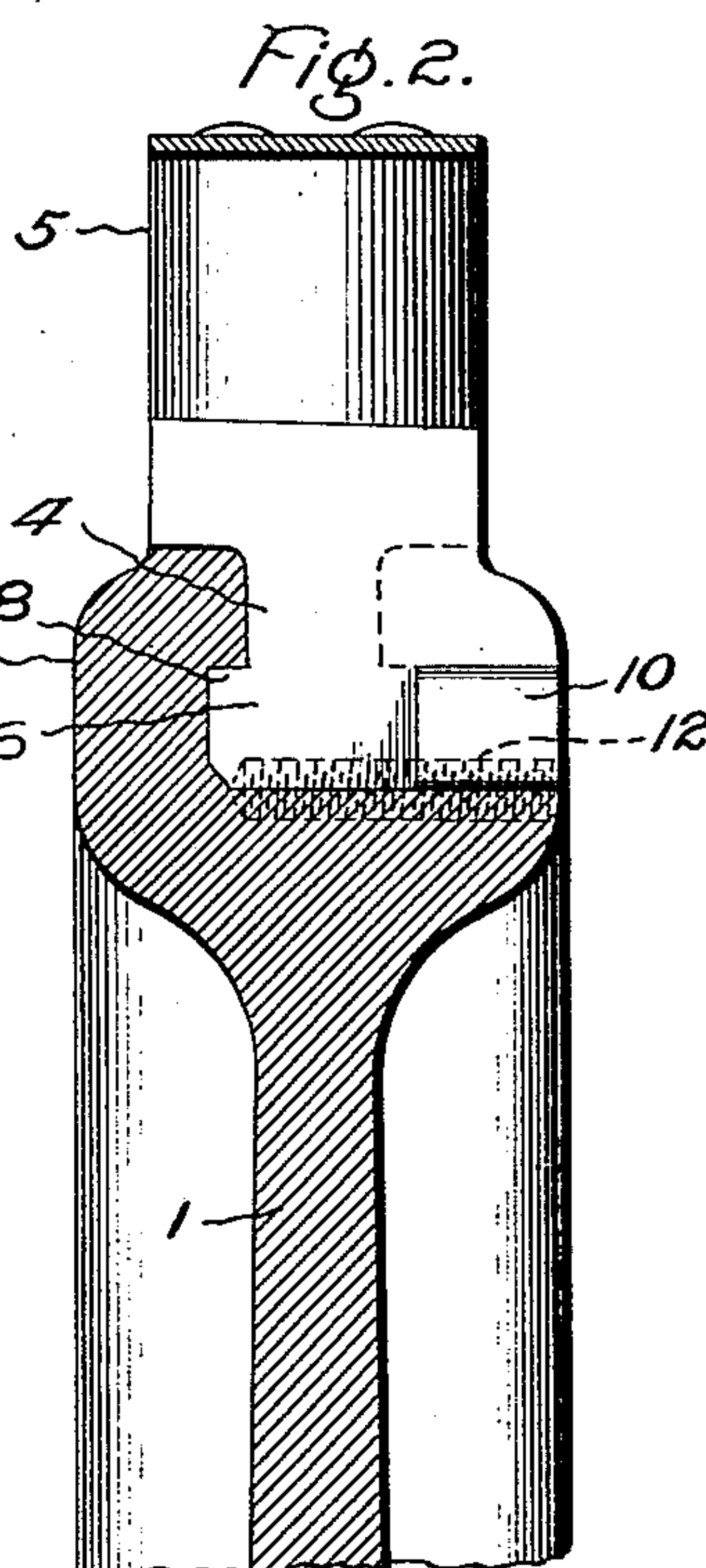
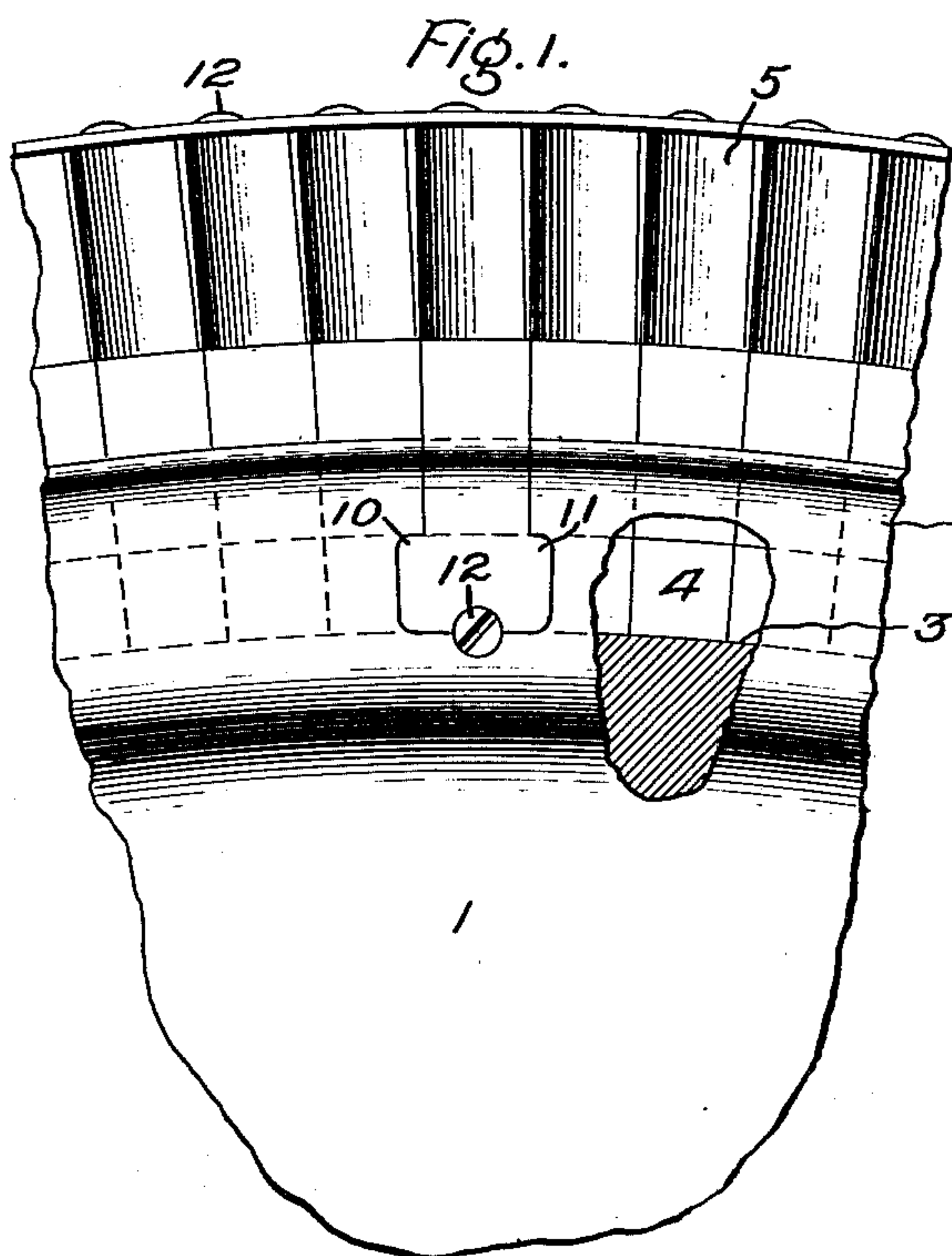


No. 883,890.

PATENTED APR. 7, 1908.

W. KIESER.
TURBINE WHEEL AND BUCKET.
APPLICATION FILED OCT. 15, 1906.



Witnesses:
Marcus L. Byng.
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Att'y

UNITED STATES PATENT OFFICE.

WALTER KIESER, OF BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

TURBINE-WHEEL AND BUCKET.

No. 883,890.

Specification of Letters Patent.

Patented April 7, 1908.

Application filed October 15, 1906. Serial No. 338,894.

To all whom it may concern:

Be it known that I, WALTER KIESER, a citizen of Switzerland, residing at Berlin, Germany, have invented certain new and useful Improvements in Turbine-Wheels and Buckets Therefor, of which the following is a specification.

The present invention relates to the construction of turbine wheels and buckets therefor, and has for its object to provide a bucket wheel of improved construction which is especially adapted for high bucket speeds.

In the accompanying drawing which illustrates one of the embodiments of my invention, Figure 1 is a partial view in elevation of a bucket wheel; Fig. 2 is an axial section thereof; Fig. 3 is a plan view thereof; Fig. 4 is an axial section of the wheel showing the arrangement whereby the buckets can be inserted in the retaining groove in the wheel rim; and Fig. 5 is a perspective view of a locking bucket.

1 represents the web of the wheel having a rim 2, the latter containing a groove 3 to receive the bases 4 of the buckets 5. The buckets may be of any suitable shape in cross-section, those shown being substantially crescent-shaped. Each bucket is provided with a base, the latter having an extension or shank 6 of such construction that it will engage the walls of the groove in the support and hold the bucket in place. The shank can be made in a variety of ways and of various shapes. For high bucket speeds the inverted T form shown has been found to be most satisfactory. The centrifugal force due to the rotation of high-speed buckets is very great and in choosing the form of the shank it is important that when the wheel is rotating there shall be no horizontal component tending to spread the walls of the groove in the wheel or other support.

In the construction shown each bucket is independent of every other bucket and the base therefor is made by casting molten metal around the end of the bucket. The base will usually be finished somewhat before being mounted in place. All the buckets are alike except the one or more locking buckets, the latter being provided with an extension that is arranged to fill the recess through which the buckets are fed into the groove.

In order to introduce the buckets into the groove, one, two or more side recesses 7 are

provided which enter the groove 3 and extend through the side of the rim of the wheel. Each recess is of such a size and shape that the shanks of the buckets can readily be inserted, and from it into the groove. In Fig. 5 is shown one of the locking buckets. It is provided with a shoulder 8 adapted to engage with the shoulder 9 formed on the rim of the wheel. It is also provided with oppositely extending ribs or projections 10 and 11 which enter recesses formed in the sides of the main recess 7 and engage suitable shoulders. These ribs or projections are made strong since they take a large part of the centrifugal strains on the locking bucket. The total strain is therefore divided between these projections and the shoulder 8. It will thus be seen that the locking piece has a three point bearing, one at the front and the other two on the sides. The bucket extends upward from the base and at its upper end is provided with one or more tenons 12. In the case of relatively thin and wide buckets intended for very high bucket speeds it is desirable to provide two tenons which enter correspondingly shaped holes in the cover and secure the latter in place by being riveted over. The locking bucket, as before stated, is constructed so as to withstand the high centrifugal strains to which it is subjected, and there is no tendency for it to work out axially owing to the fact that the strains are perpendicular to the axis. In order to prevent the locking bucket from working out from any cause whatsoever a screw 13 is provided which is threaded into the rim and also into the base of the bucket. After the screw is seated the metal surrounding the head can be upset to prevent the screw from backing out. In making the wheel the web and rim are machined in the usual way after which the groove 3 is turned. The side opening recess 7 of which one or more may be provided are then made.

It is to be observed that the fastening means for the locking bucket are situated below the peripheral face of the wheel where they are out of the way, and are of such a character that they will not be injured in case the buckets rub on a stationary part of the machine. It is also to be noted that the screw 13 merely serves to prevent the locking bucket from moving axially and therefore has no part in resisting the centrifugal strains to which the bucket is subjected.

Although the invention has been shown in connection with a rotating member of a turbine it can be used with a stationary member, or with both the rotating and stationary members if desired.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A turbine wheel having a rim with an inverted T-shaped groove and a filling recess opening laterally through the side of the rim, a plurality of buckets having bases fitted into the groove, a locking piece, axially extending shoulders between the locking piece and the rim which are situated below the peripheral face of the rim for restraining the said piece against centrifugal strains, and a means for preventing the locking piece from moving axially.

2. A turbine wheel having a rim with a groove therein and a side opening recess, a plurality of buckets mounted in the groove, a locking piece carrying a bucket and filling the recess, and shoulders between the locking piece and the walls of the recess and located above the bottom of the groove to hold said piece against centrifugal force.

3. A turbine wheel having a rim with a groove therein and a side opening recess, a plurality of buckets mounted in the groove, a locking piece carrying a bucket and filling

the recess, shoulders between the locking piece and the walls of the recess to hold said piece against centrifugal force, and a screw which is threaded into the rim and said piece to prevent the latter from working axially out of the recess.

4. A turbine wheel having a bucket supporting portion which is provided with a groove having under cut walls and a side opening recess, buckets the bases of which are mounted in the said groove and retained by the walls thereof, and a locking piece which fills said recess and is supported by a three-point bearing.

5. A turbine wheel having a bucket supporting portion which is provided with an inverted T-shaped groove and a side opening filling recess, buckets having T-shaped bases fitted into the groove, a locking piece having a projection on the front which engages a wall of the bucket retaining groove, and means between the side of the locking piece and the walls of the said recess cooperating with the projection to hold said locking piece against centrifugal force.

6. An individual bucket for a turbine comprising a single body portion having a tenon formed on one end and a base cast around the other, the said base being provided with shoulders adapted to engage in a support for holding the bucket.

In witness whereof, I have hereunto set my hand this sixth day of Oct., 1906.

WALTER KIESER.

Witnesses:

ALEX. F. MACDONALD,
HELEN ORFORD.