

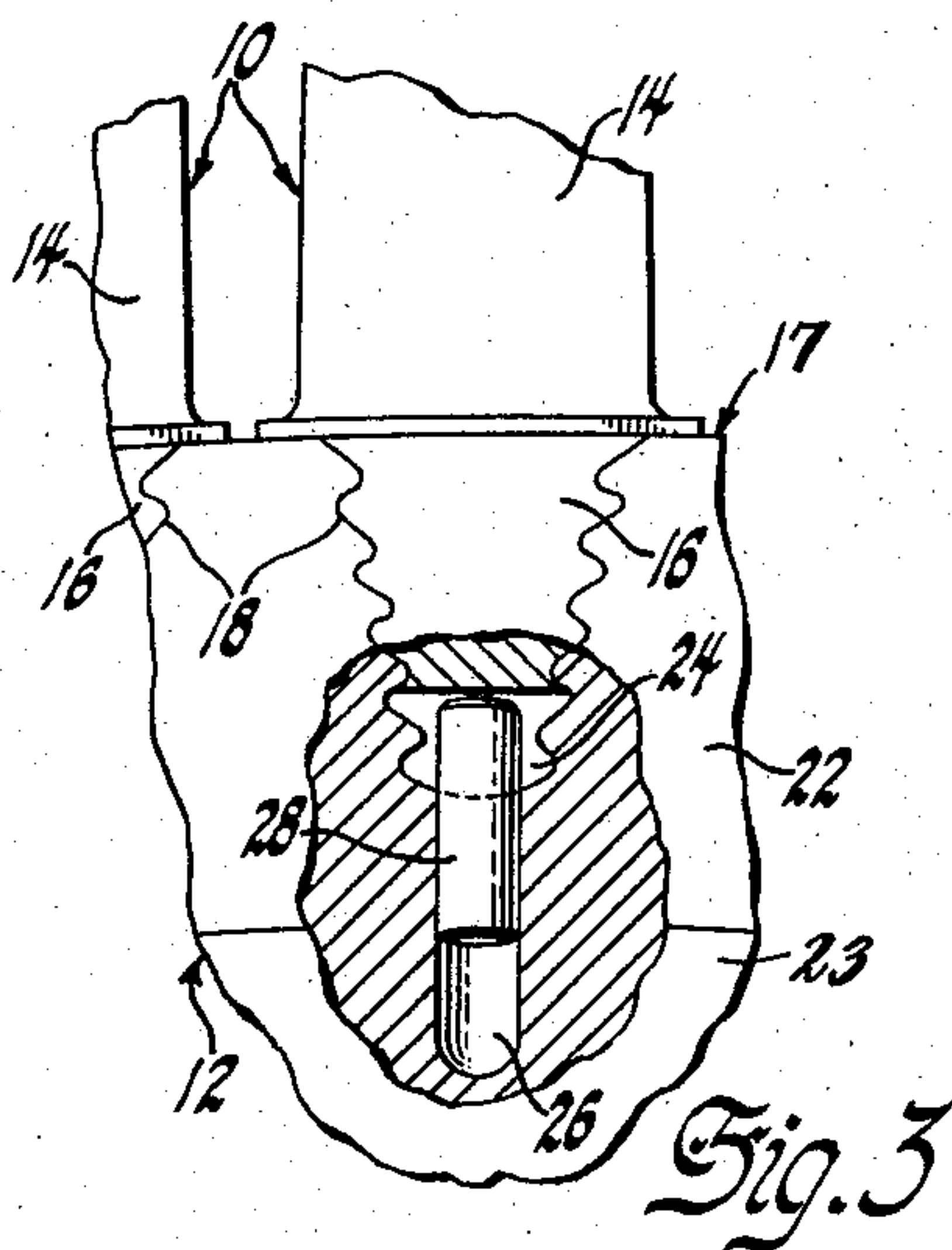
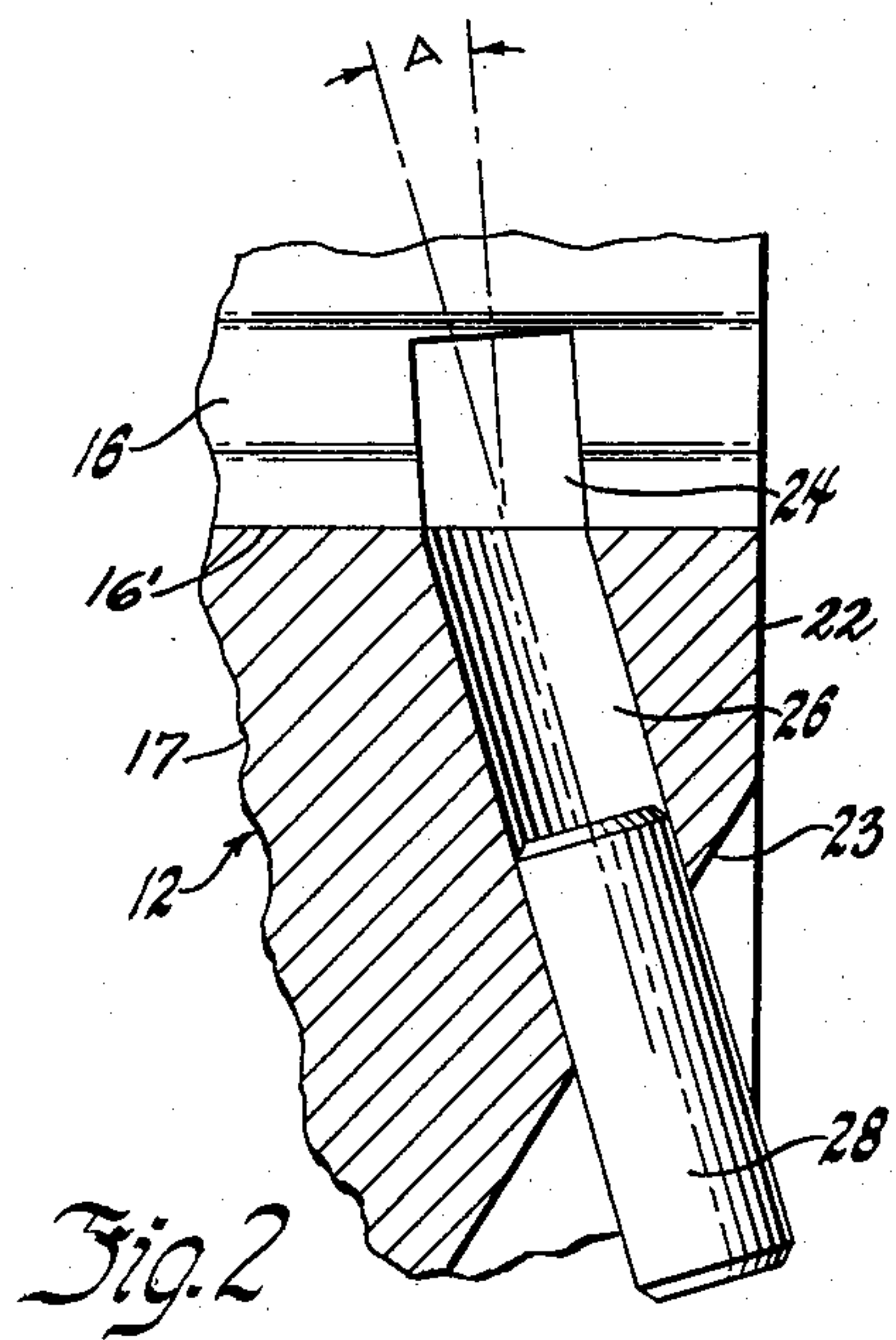
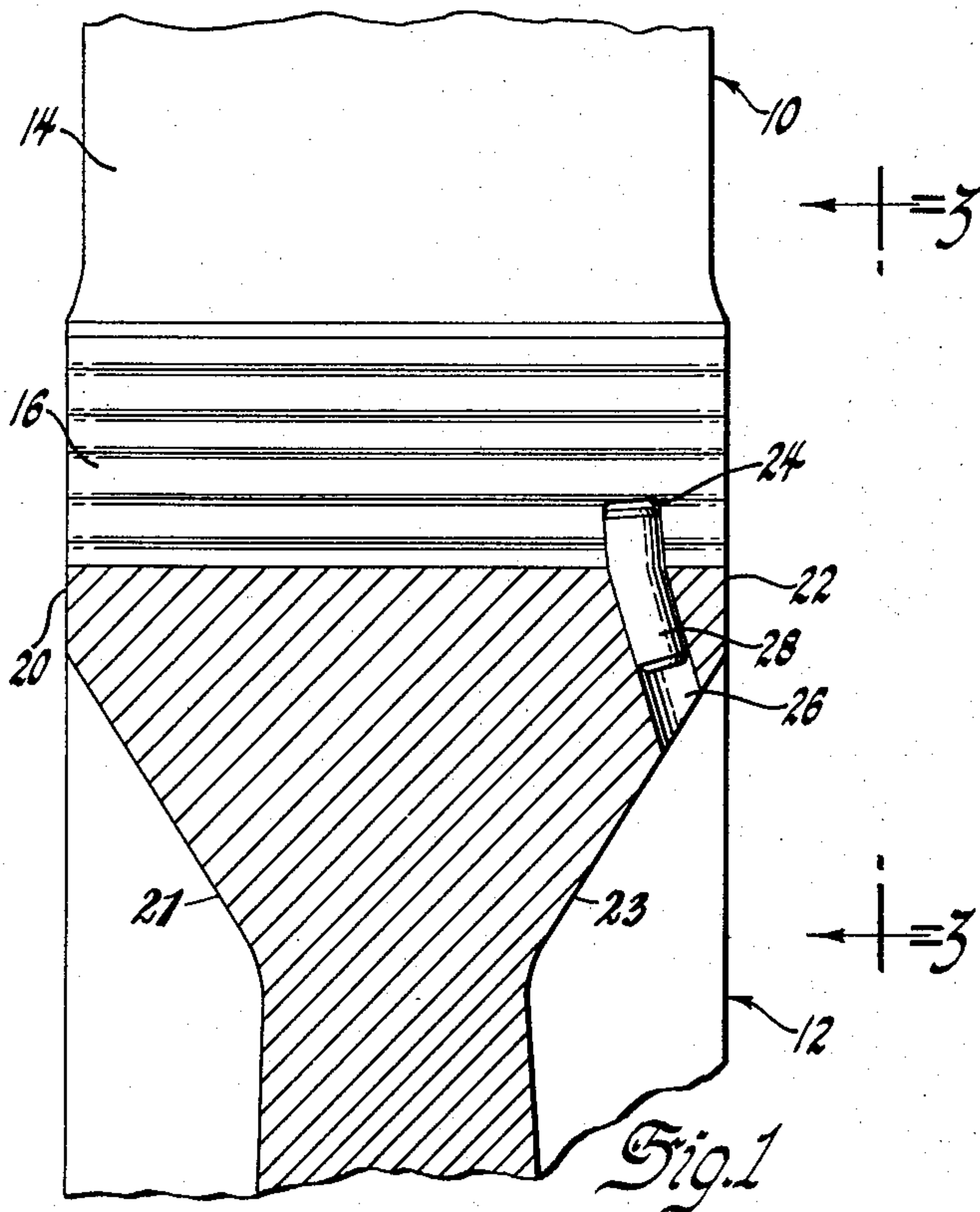
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BLADE FASTENINGS

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1

2,953,348

BLADE FASTENINGS

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1 Claim. (Cl. 253—77)

This invention relates to turbomachines, and more particularly, to a means for securing buckets thereon.

The invention is especially applicable to axial flow elastic fluid turbine and compressor rotors having buckets or blades removably dovetailed thereto. The buckets of such machines are usually secured to the rotor by inserting the roots of the buckets in grooves in the rim of the rotor, and by doweling the roots to the rim to retain them in the grooves. The doweling is accomplished by providing communicable passages in the bucket roots and the rotor rim and by inserting dowels in the passages. The dowels were retained in the passages by peening the entrances of the rotor rim passages prior to the invention.

An object of the invention is to provide a simplified arrangement for retaining the dowels in the passages without deforming the rotor rim.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is an axial section of the rim portion of a turbine rotor disk and a turbine bucket having its root portion secured thereto by doweling according to the invention,

Fig. 2 is an enlargement of a portion of Fig. 1 illustrating the dowel partially inserted in the rotor rim passage prior to its insertion in the turbine bucket root passage, and

Fig. 3 is a partial view on a smaller scale taken on line 3—3 of Figure 1 and partially broken away on the center lines of the rim passage and the root passage.

Referring now to the drawings, a circumferential row of radially projecting buckets 10 are secured to the rim portion of a turbomachine rotor 12, which may take the form of a single gas turbine wheel or disk as illustrated. The buckets 10 include a cambered blade portion 14 and a root portion 16 which may be grooved to the conventional fir tree configuration illustrated. The rim 17 of the turbine disk 12 is provided with a circumferential row of complementary slots or grooves 18 to receive the bucket roots 16. The grooves 18 extend between the side faces 20 and 22 of the turbine disk so that the bucket roots 16 may be dovetailed therein. The fir tree dovetail comprises the usual interengaging dovetail parts on the root and the rotor extending transversely of the rim to secure the buckets to the rotor radially and tangentially. Each bucket root 16 is provided with a cross passage or slot 24 which is located for communication with a generally radial bore or passage 26 in the rotor rim. The bores 26 extend between the bottoms of the rotor grooves 18 and the face portion 22 of the rim. The axis of the root slot 24 is slightly angled with respect to the axis of the rim passage 26 as indicated by the angle A in Fig. 2. Each bucket root is secured in its rotor groove by a bendable dowel pin 28 which is inserted in the rim passage and driven upwardly into the bucket slot. The dowels 28 are bent

2

or kinked on entry into the root passages because of the angular relation between the rim and root passages and are thereby automatically retained against removal. A difference of five degrees between the passages has been found to be satisfactory, although other differences may be utilized. The minimum difference that insures against dowel removal depends on the physical properties of the dowel and its fit in the passages. The dowels 28 are preferably shearable so that the removal of the bucket from the rotor may be readily accomplished by driving the bucket root out of the rotor groove. With the bucket removed, the stub of the dowel can easily be driven out of the hole 26.

While the preferred embodiment of the invention has been described fully in order to explain the principles of the invention, it is to be understood that modifications in structure may be made by the exercise of skill in the art within the scope of the invention, which is not to be regarded as limited by the detailed description of the preferred embodiment.

I claim:

In combination, a turbomachine rotor having a rim including side faces and having a groove extending generally transversely across the rim, a bucket having a root received in the groove including an exterior surface extending along the bottom of the groove, the root and the rotor having interengaging dovetail parts extending transversely of the rim to retain the bucket radially and circumferentially of the rotor, the rim having a passage extending in a generally radially inward direction from the bottom of the groove to one of the side faces, the bucket root having a passage in communication with the rim passage after insertion of the bucket root into the groove, said bucket root passage extending at substantially a right angle to the bottom of said groove and a normally straight dowel inserted in the rim and bucket root passages to retain the bucket in the groove transversely of the rim, the rim and bucket root passages being slightly angled with respect to each other and having abutting edges so that the dowel is bent upon insertion into the passages and thereby retained therein, said abutting edges of said passages contacting opposite sides of said dowel and lying in a common axial plane through the bottom of said groove, the dowel being shearable and extending across the said exterior surface of the bucket root adjacent the bottom of the groove substantially at a right angle to the said exterior surface so that the bucket may be readily removed from the rotor by knocking the bucket root out of the groove axially of the rim and thereby shearing the dowel.

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