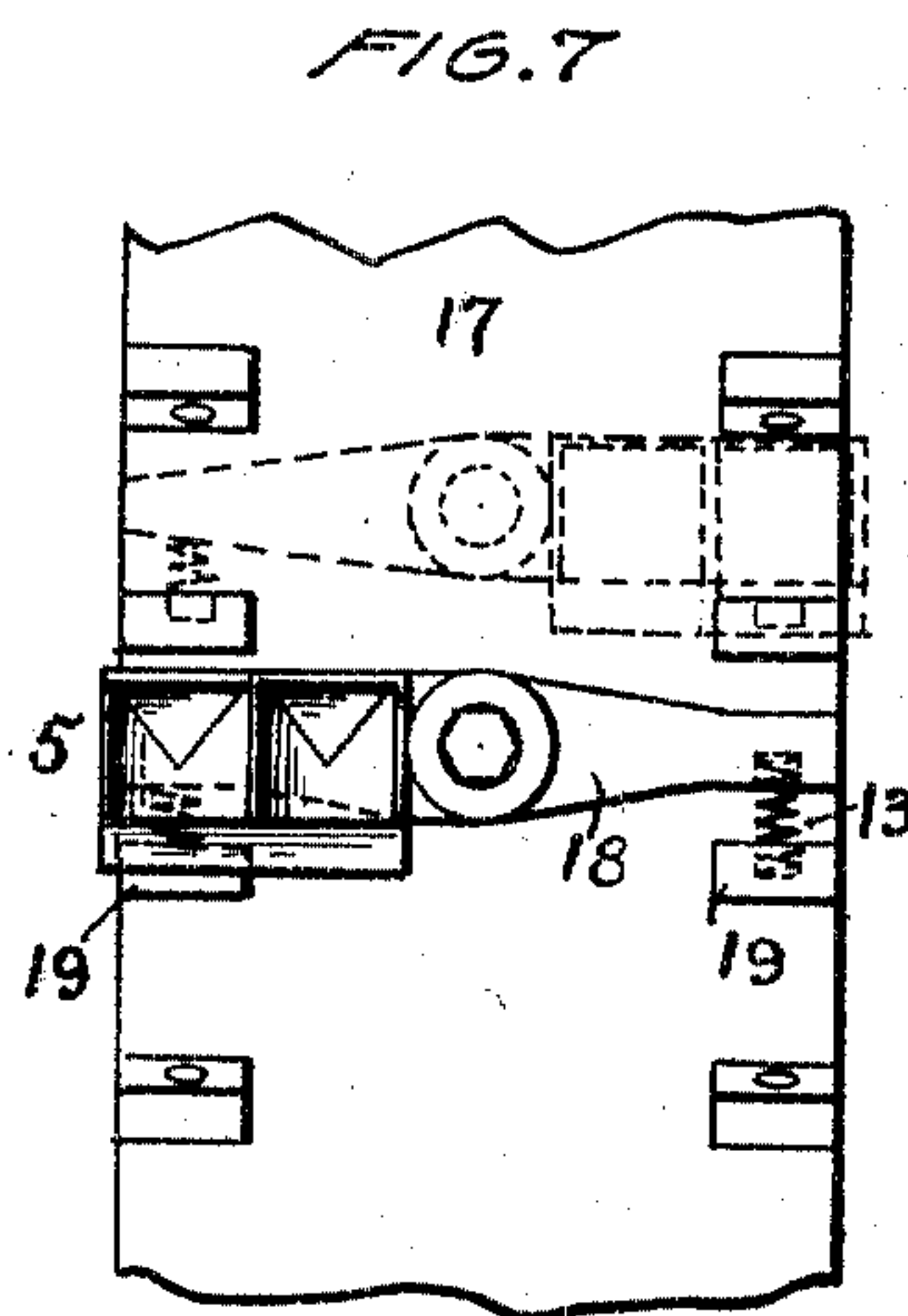
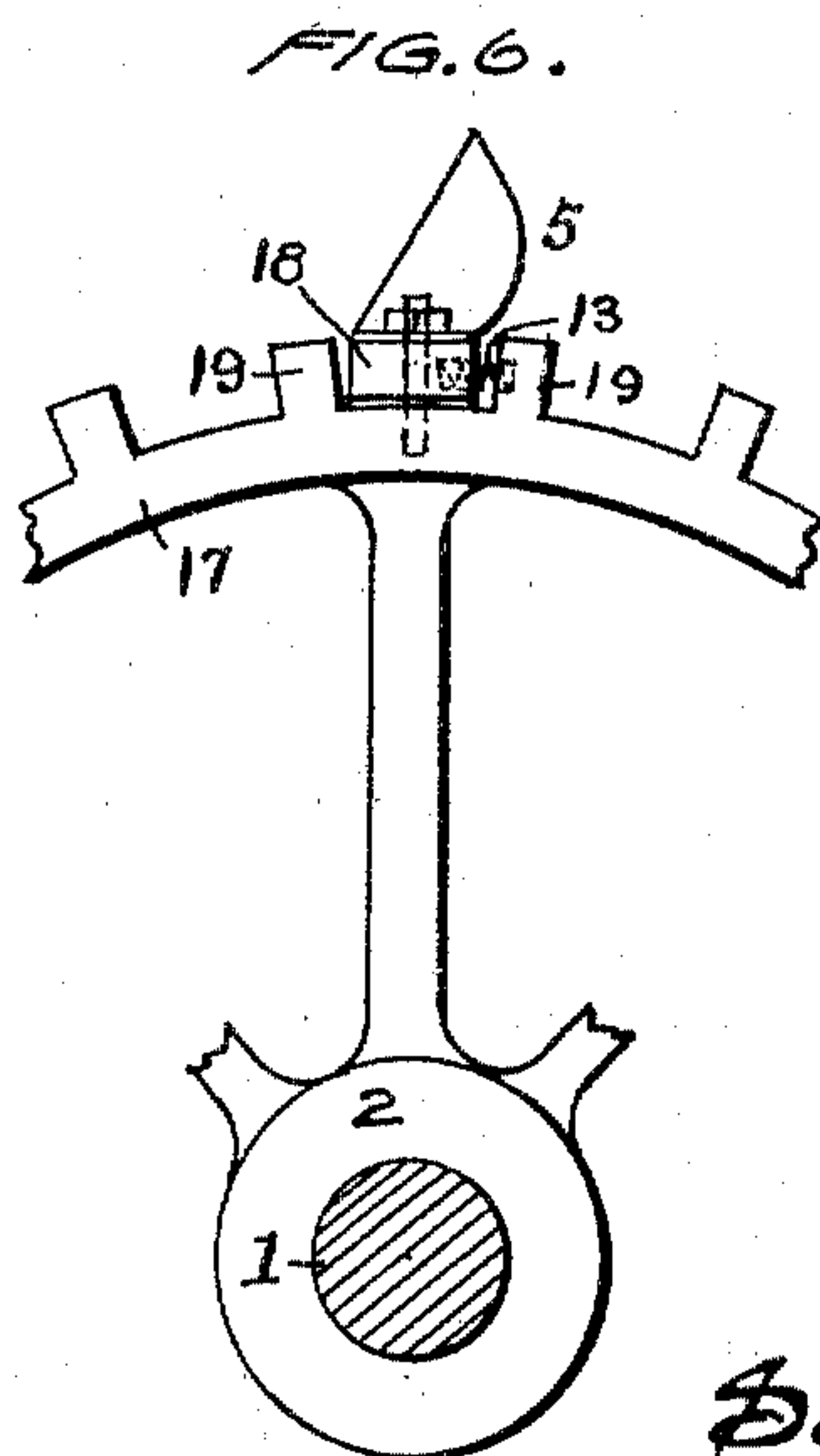
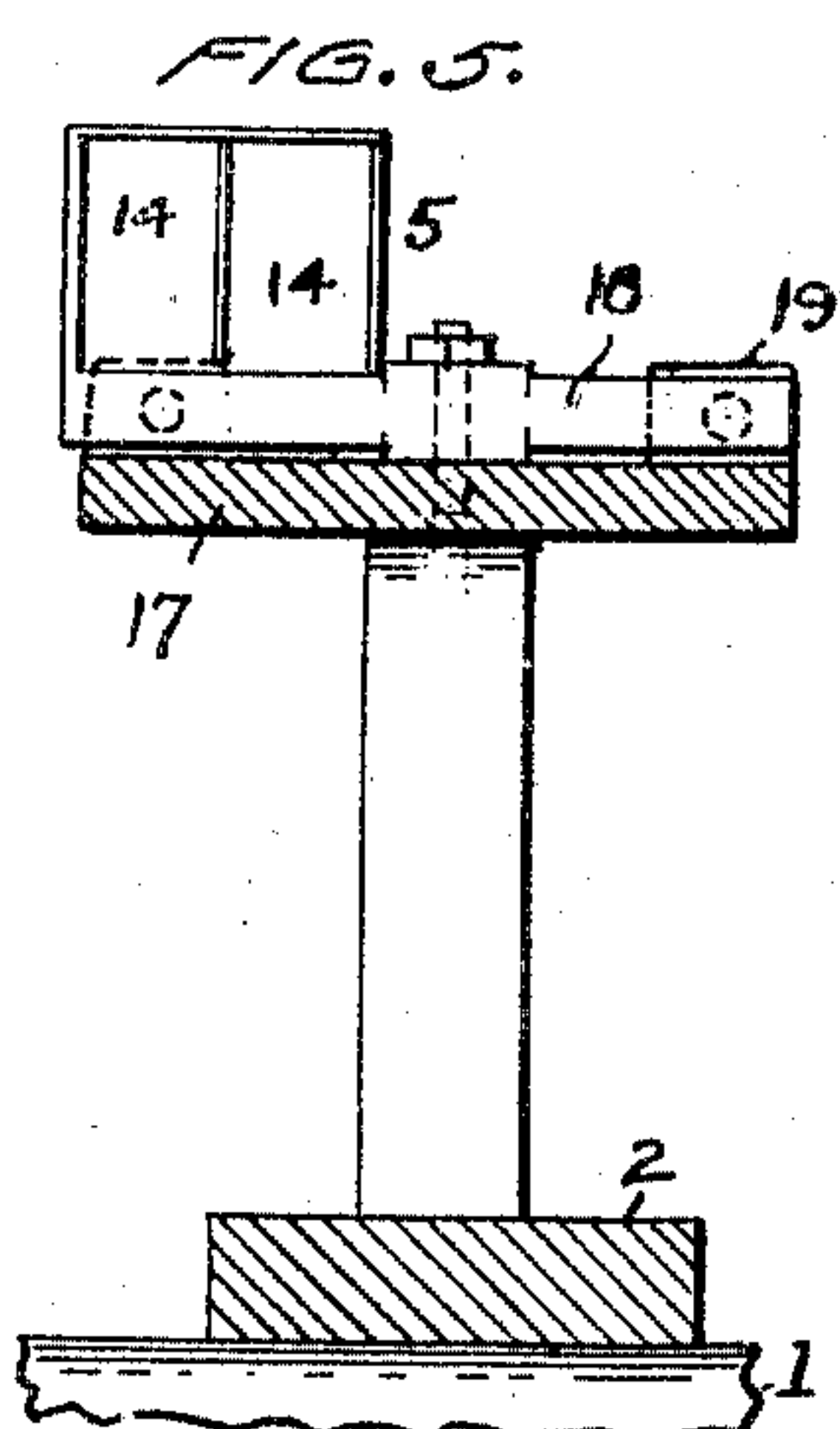
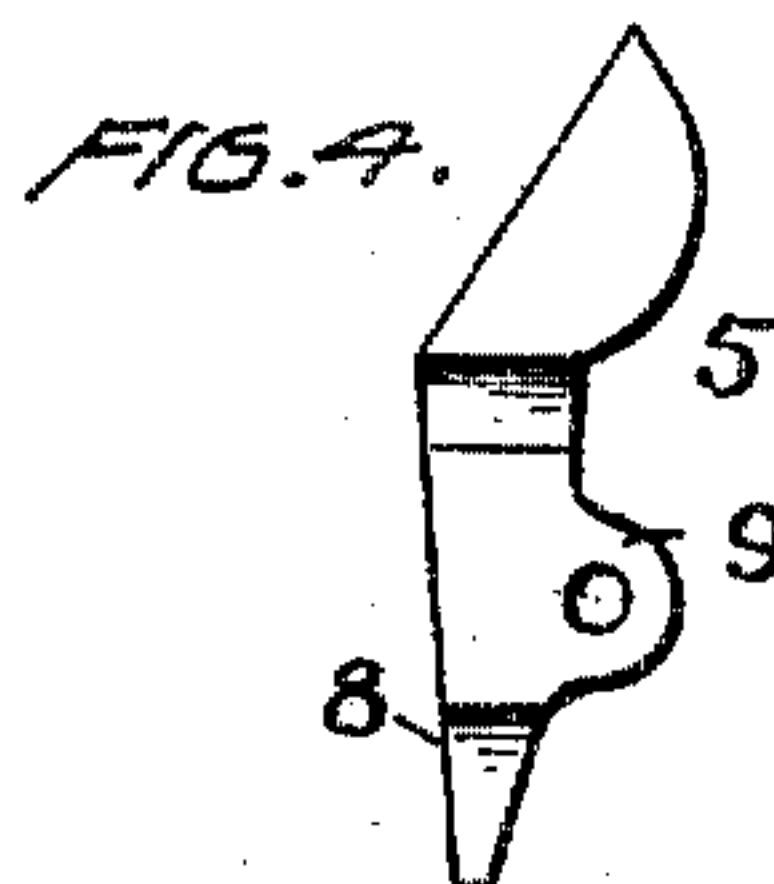
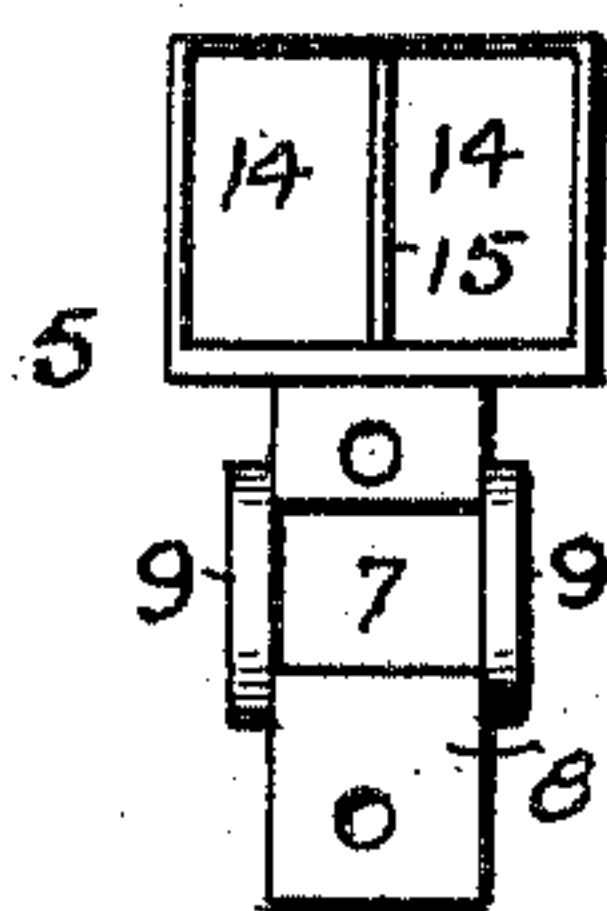
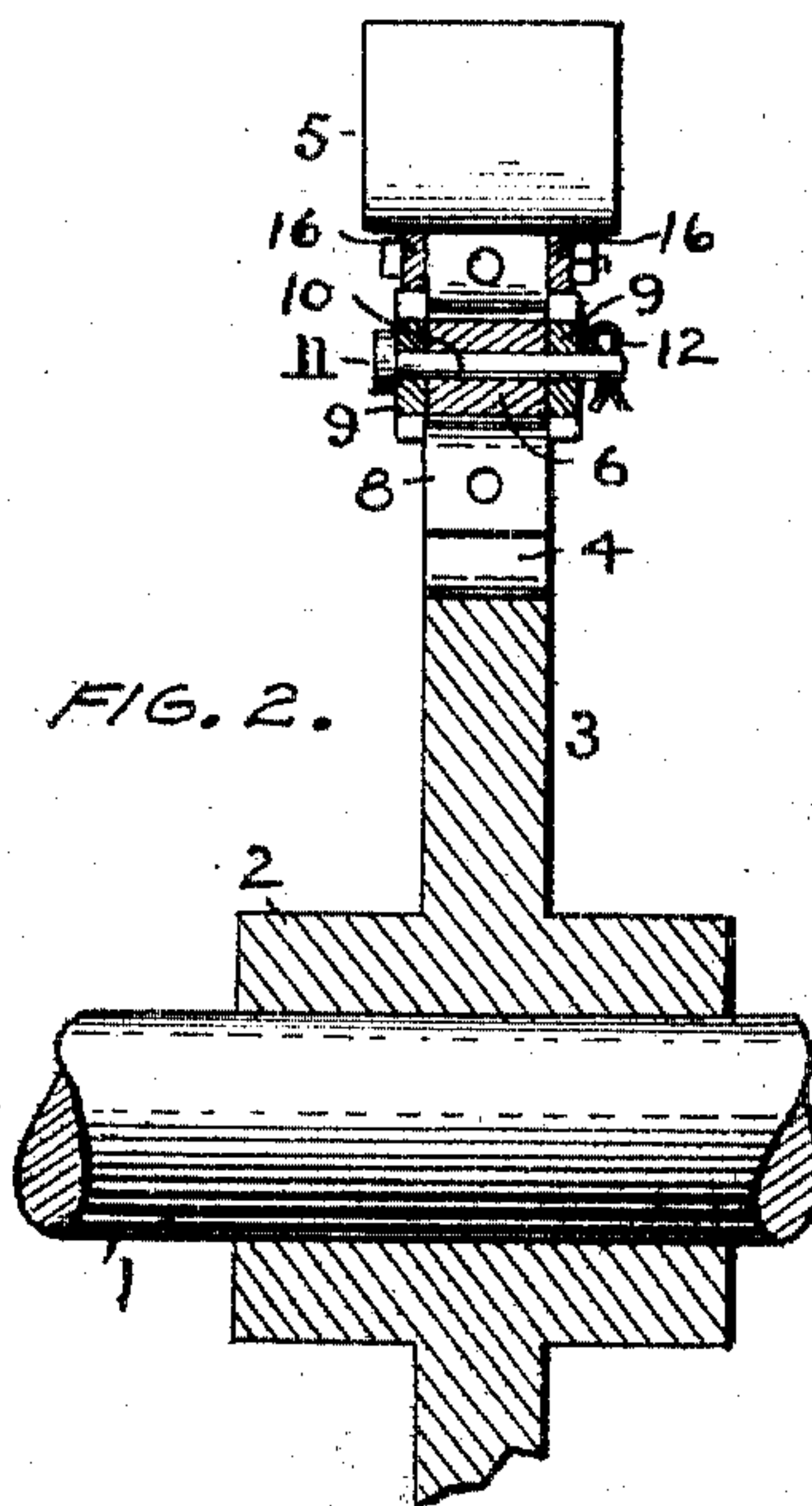
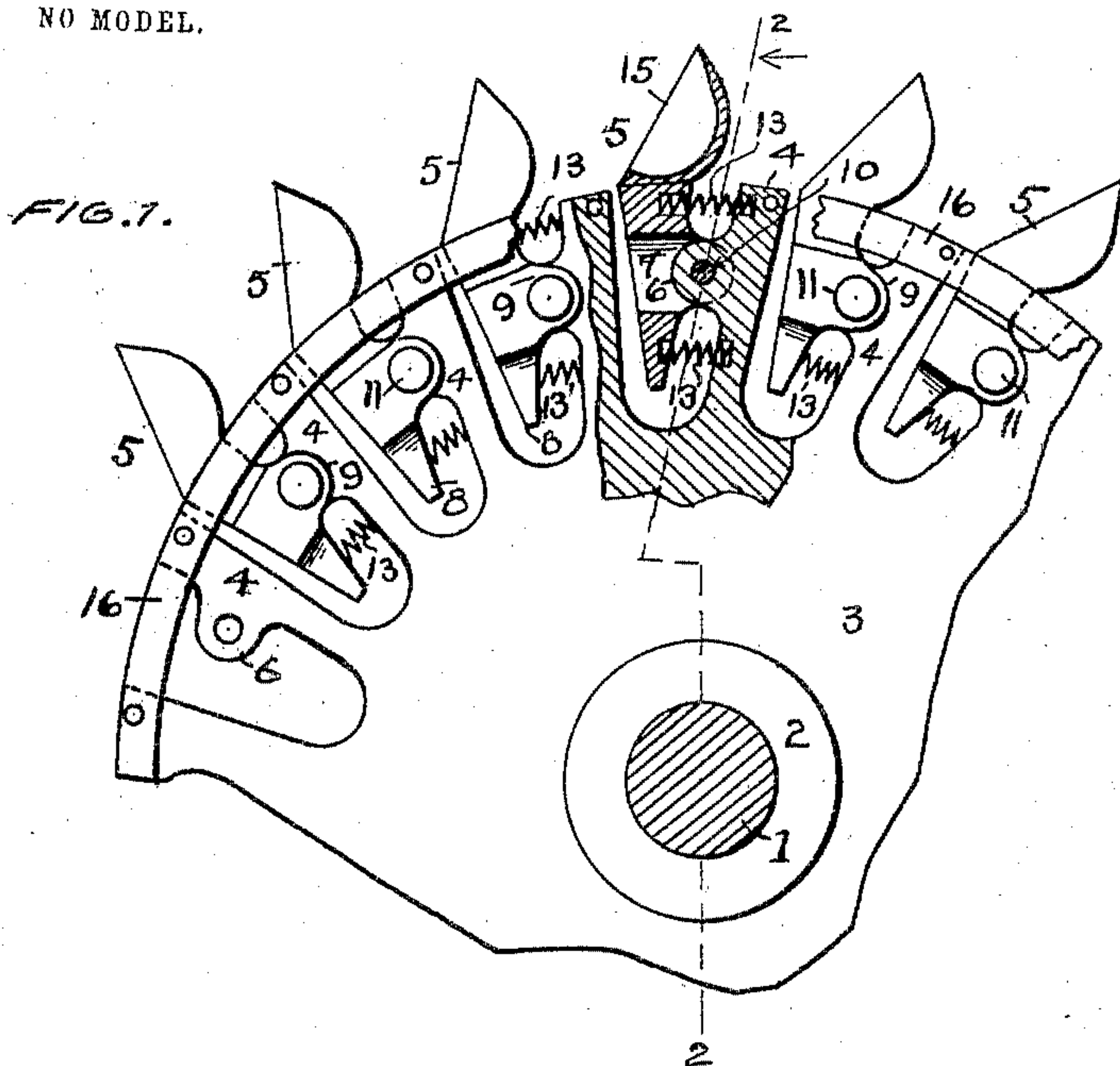


No. 776,093.

PATENTED NOV. 29, 1904.

S. SELDEN.  
IMPACT WATER WHEEL.  
APPLICATION FILED DEC. 8, 1903.

NO MODEL.



WITNESSES

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ATTY.



# UNITED STATES PATENT OFFICE.

SAMUEL SELDEN, OF DENVER, COLORADO.

## IMPACT WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 776,093, dated November 29, 1904.

Application filed December 8, 1903. Serial No. 184,279. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL SELDEN, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented new and useful Improvements in Impact Water-Wheels, of which the following is a specification.

This invention relates to water-wheels of the impact or "Pelton" type; and its object is to provide such a wheel with buckets that will yield under the impact of the water-jet in order to relieve the wheel from the jar and strain caused by the powerful jet striking the buckets as they come successively in line with it and also increase the efficiency of the wheel.

To this end I provide the wheel with a plurality of buckets each pivotally secured to the wheel and provided with a cushioning device, such as a spring or springs, which will permit the bucket to yield somewhat when struck by the water-jet and impart the energy of said jet to the wheel in part by the recoil of said cushioning device. In this way those parts of the wheel which are rigid and are rigidly secured to the shaft will be relieved from a great deal of jar and shock.

In the accompanying drawings, Figure 1 is a side view of a portion of a wheel embodying my improvements shown partly in section. Fig. 2 is a cross-section on the line 2 2, Fig. 1. Fig. 3 is a front elevation of one of the buckets. Fig. 4 is a side elevation thereof. Fig. 5 is a sectional elevation of a portion of a wheel embodying a modification. Fig. 6 is a side view of the same. Fig. 7 is a top plan view of the same.

The wheel is mounted on an axle 1 and comprises a hub 2, carrying a web 3, in the periphery of which are cut a series of radial notches, leaving teeth 4, to which the buckets 5 are pivotally secured. For this purpose each tooth has a knuckle 6 on one edge adapted to fit into a socket 7 in the shank 8 of the bucket. Perforated ears 9 project from said shank adjacent to each side of the socket, and through said ears and the knuckle is passed a pivot-pin 10, which is preferably secured in place by a head 11 at one end and a cotter-pin 12 at the other end.

The bucket is held in a normally radial position by means of two springs 13, situated between the shank and the tooth, one above the pivot and the other below it. The springs are preferably held in place by entering pockets in the shank and tooth, as shown. The bucket proper is preferably of the usual shape, having two curved cupped compartments 14, separated by a partition 15, which divides the jet of water.

The wheel is strengthened by two rings or hoops 16, which are bolted to the sides of the teeth near or at their outer ends. The buckets can play freely between these rings.

In the case of a wheel of small diameter, where there is not radial depth enough for the formation of suitable teeth, the buckets may be secured to the wheel in the manner shown in Figs. 5, 6, and 7. The wheel is provided with a wide rim 17, to which is pivoted a tangent bar 18, carrying a bucket at one end. The springs 13 are located between said bar and lugs or teeth 19, projecting radially from the rim.

To distribute the strains more evenly, the buckets may be staggered, if desired, as indicated in dotted lines in Fig. 7, two water-nozzles being used when this arrangement is adopted, as will be readily understood.

The operation of my invention is as follows: The elastic or yielding mounting of the bucket permits it to move or oscillate forward and backward in the plane of the wheel by the combined actions of the force of the jet or stream of water and the springs or other cushioning device. The forward motion occurs when the bucket enters the jet, the outer spring being compressed by the force of the water delivered into the bucket. As soon as the next succeeding bucket cuts off the jet that has compressed the outer spring said spring recoils and delivers the energy stored in it to the wheel. The inner spring acts simply as a buffer to prevent the recoil of the outer spring from throwing the bucket too far backward, in which case it would strike the following tooth, and thereby destroy the beneficial effect of the energy stored in the recoiling spring.



Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An impact water-wheel having a plurality of wheel-actuating buckets each having a shank, a pivot connecting each shank with the wheel, and cushioning devices acting on each shank at points on both sides of the pivot.

2. An impact water-wheel, having in its periphery a plurality of radial teeth each provided with a knuckle on one edge, and a plurality of buckets pivoted to said knuckles.

3. An impact water-wheel, having in its periphery a plurality of radial teeth each provided with a knuckle on one edge, a plurality of buckets having shanks pivoted to said knuckles, and springs between said shanks and teeth.

4. An impact water-wheel, having a plurality of radial teeth in its periphery, a knuckle on each tooth, a bucket having a shank provided with perforated ears and a socket cooperating with said knuckle, a pivot-pin passing through said ears and knuckle, and springs located above and below said knuckle between said shank and said tooth.

5. An impact water-wheel, having a plurality of radial teeth, a strengthening-ring secured to the outer ends of said teeth, and

wheel-actuating buckets pivotally mounted between said teeth, and projecting beyond the same.

6. An impact water-wheel, having a plurality of radial teeth, strengthening-rings secured to the outer ends of said teeth, wide jet-receiving buckets outside of said teeth, having shanks extending in between the rings and teeth, and pivotally supported by said teeth, and cushioning devices between each of said shanks and an adjacent tooth.

7. The combination with an impact water-wheel having radial teeth, of a bucket having a rigid shank pivoted between two teeth, and a cushioning device acting on said shank on the opposite side of the pivot from the bucket.

8. The combination with an impact water-wheel having radial teeth, of a bucket having a rigid shank pivoted between two teeth, and cushioning devices acting on said shank at points on both sides of the pivot.

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

SAMUEL SELDEN.

Witnesses:

R. W. HARRINGTON,  
JOSA FULHAM.