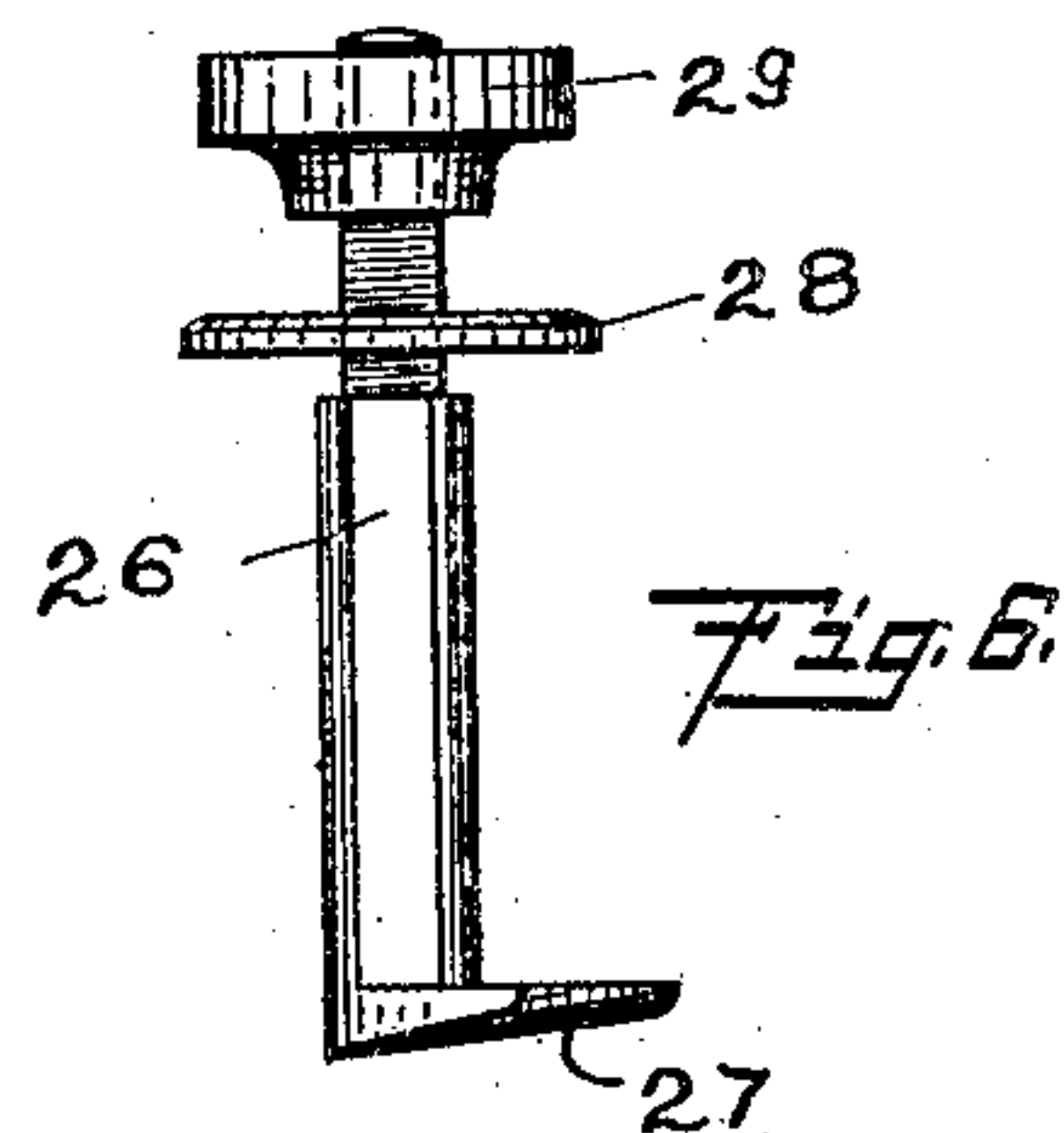
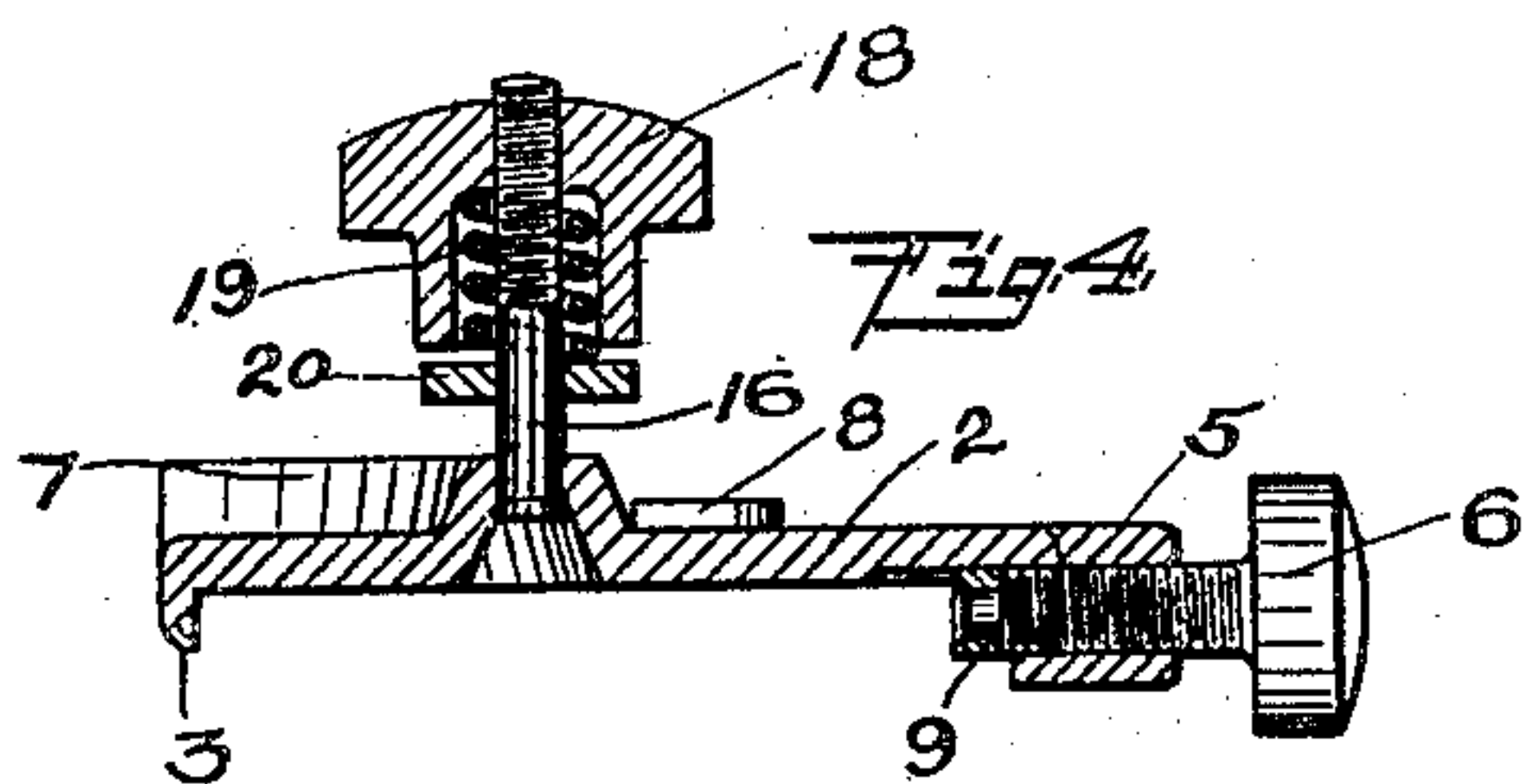
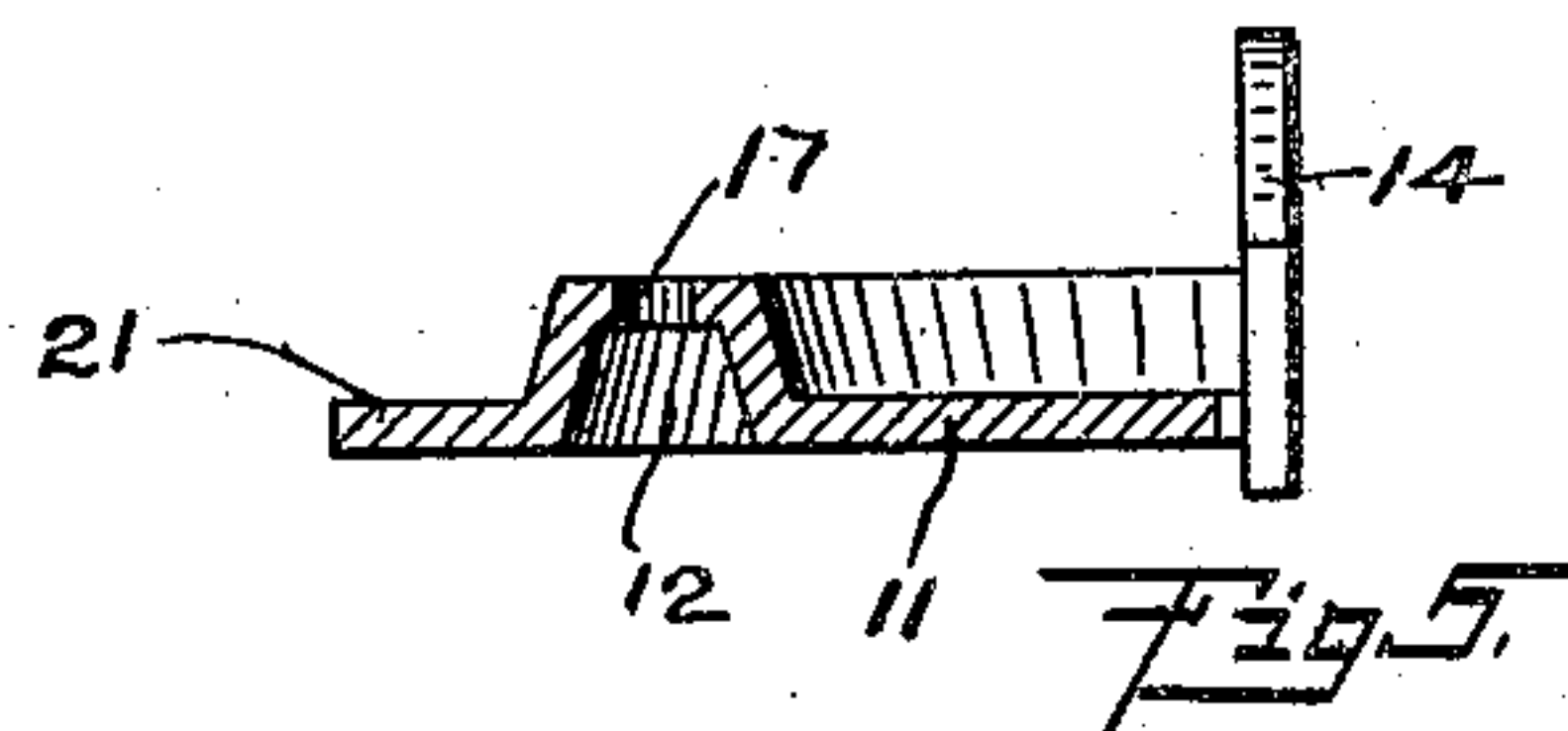
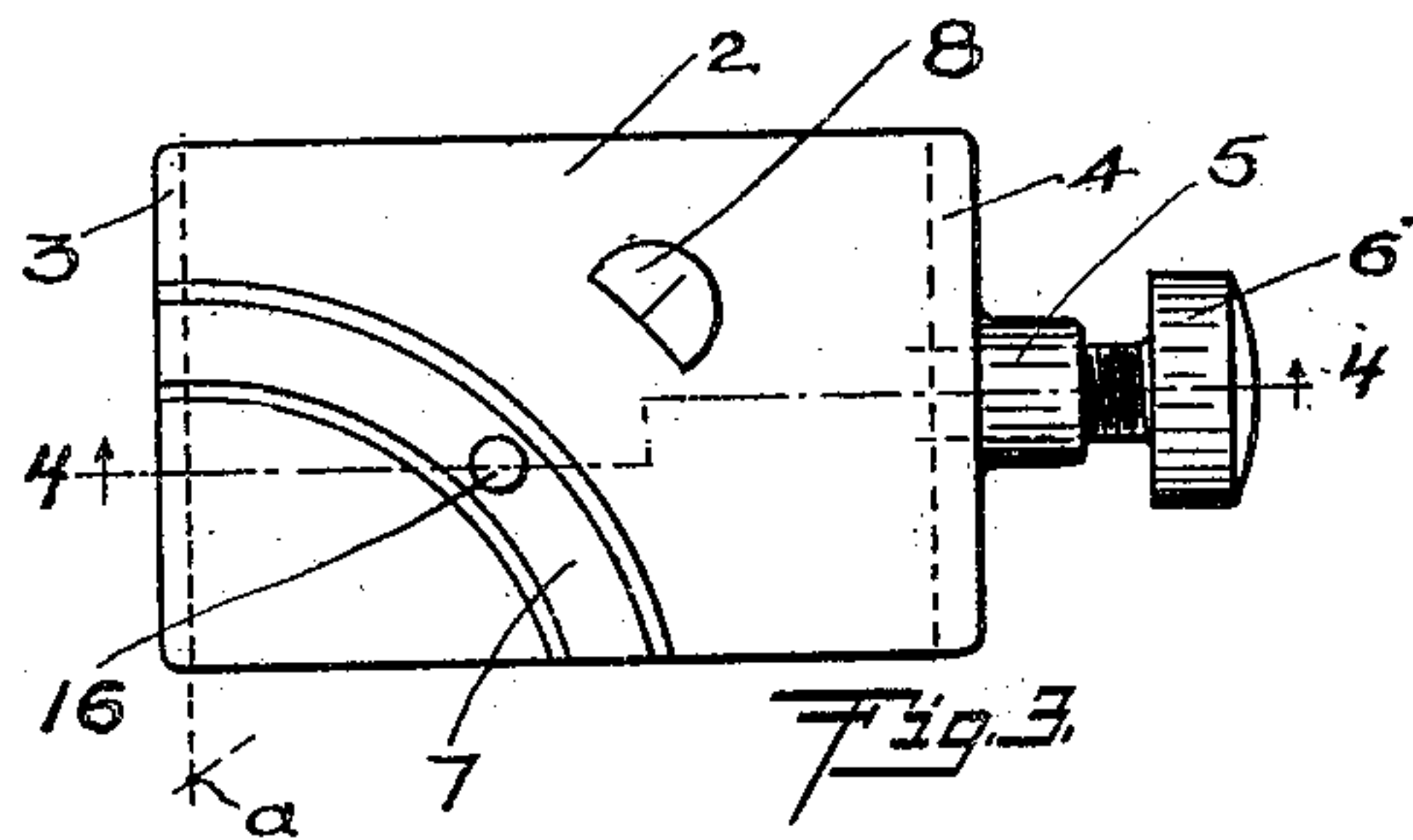
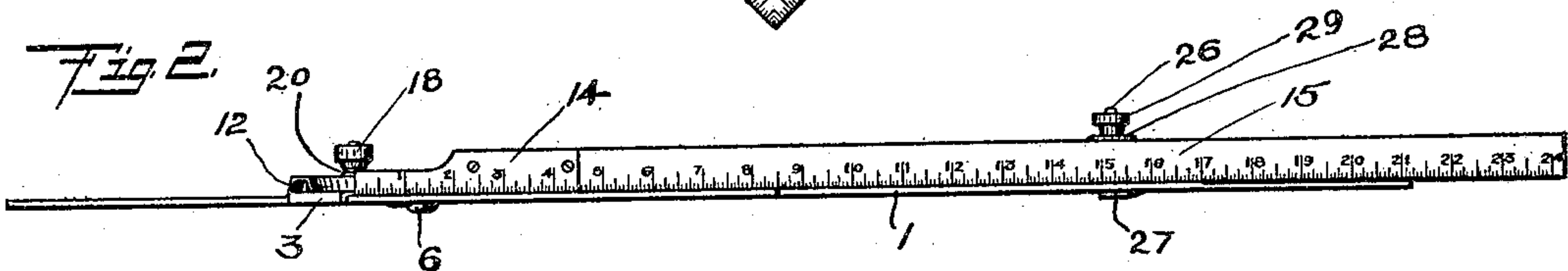
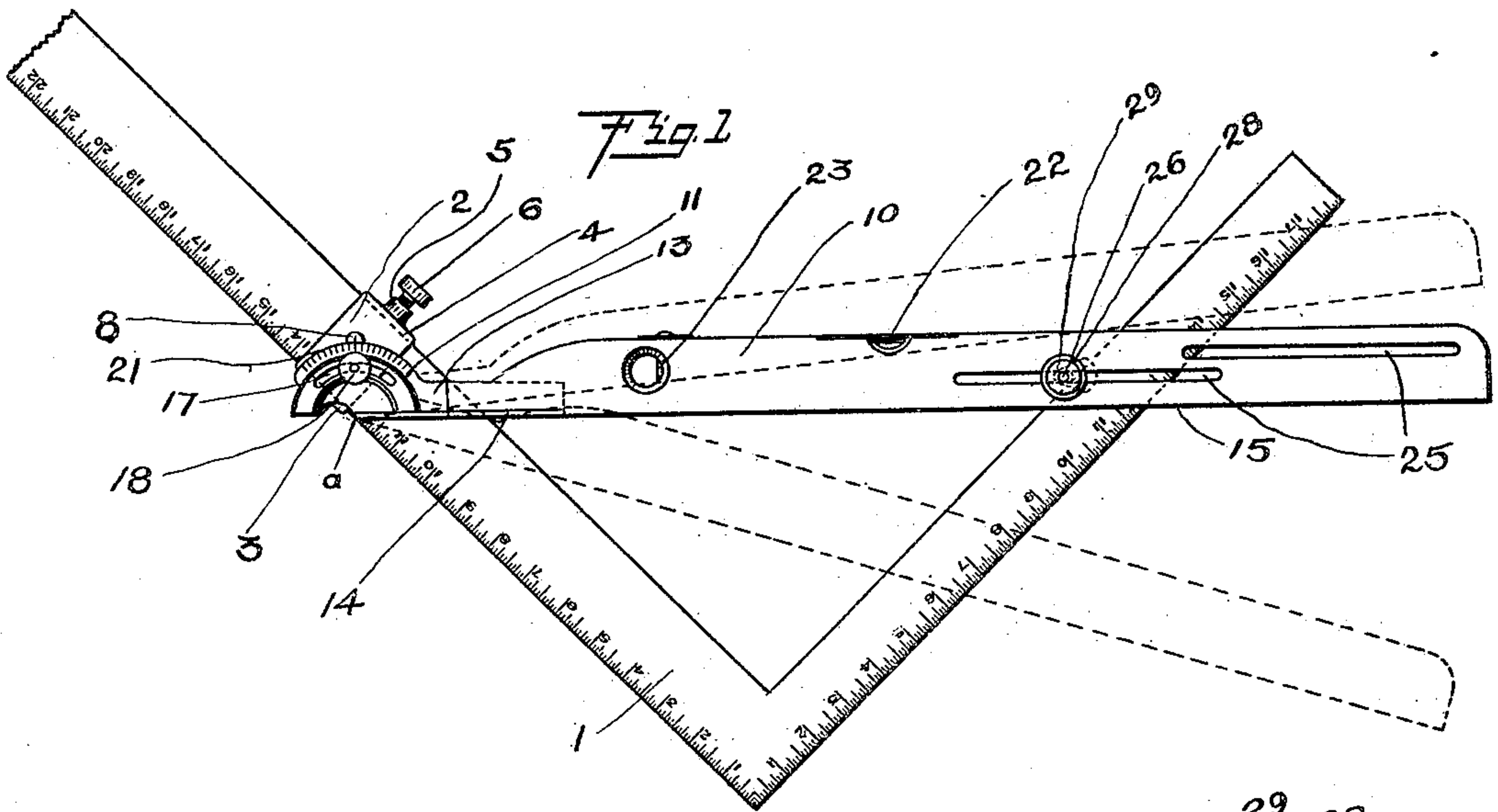


No. 820,311.

PATENTED MAY 8, 1906.

E. OEHRLE.
SQUARE AND LEVEL.
APPLICATION FILED AUG. 1, 1905.



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EMANUEL OEHRLE, OF OMAHA, NEBRASKA.

SQUARE AND LEVEL.

No. 820,311.

Specification of Letters Patent.

Patented May 8, 1906.

Application filed August 1, 1905. Serial No. 272,236.

To all whom it may concern:

Be it known that I, EMANUEL OEHRLE, a citizen of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Squares and Levels, of which the following is a specification.

My invention relates to the general class of measuring instruments, and more particularly to squares, levels, and gages.

It is the object of my invention to provide a cheap and simple device to be used in combination with an ordinary carpenter's or woodworker's square to facilitate the determination and marking of the horizontal and plumb cuts on rafters, stairs, and like structures in which cuts are made at complementary angles, the determination of the length of the inclined or hypotenuse members in structures having the form of a right-angled triangle, the determination and marking of angles given in terms of "run" and "rise" and the comparison therewith of angles given in degrees, the placing of structures at any desired angle with a horizontal or vertical line, and certain other operations, which will be apparent from the description hereinafter given.

My invention consists in the combination, with a square of the class mentioned, of a head removably and adjustably attachable to one blade thereof, a graduated straight-edged arm pivotally connected with said head and so arranged that one end of the graduated straight edge thereon lies at the pivotal center, levels placed on said straight-edged arm, and means for connecting said arm to the other blade of the square from that to which the head is attached.

In the accompanying drawings is shown a device embodying my invention, in which—

Figure 1 is a plan view thereof. Fig. 2 is an edge view thereof. Fig. 3 is a detail plan view of the detachable head. Fig. 4 is a detail section of the same taken on the line 4 4 of Fig. 3. Fig. 5 is a detail transverse section of the pivot-head of the straight-edged arm, and Fig. 6 is a detail of the clamping-screw for attaching the straight-edged arm to one blade of the square.

In the drawings, 1 represents an ordinary steel square of the class used by carpenters and woodworkers, comprising two blades integral with each other, the edges of each blade being at right angles with the edges of the other blade, said edges ordinarily being

graduated in inches and suitable subdivisions thereof, and one of the blades usually being longer than the other and of proportionate width. On one blade of the square, preferably the longer, is attached the head 2, comprising a plate of a length slightly greater than the width of the square-blade, the flanges 3 and 4 at the ends of the plate adapted to pass over the edges of the square-blade, the clamping-screw 6 passing through the boss 5 on the flange 4 and adapted to engage the edge of the square-blade adjacent said flange and press the opposite or outer edge thereof firmly into engagement with the inner face of the flange 3, the arcuate tongue 7 on the upper side of the plate, and the boss 8 adjacent said tongue. The cross-section of the arcuate tongue is wedge-shaped, being wider at the bottom than at the top, and the axis a of the ring of which the tongue may be conceived as a part lies in the same plane as the inner face of the flange 3 and the edge of the square-blade, against which said flange is pressed by the clamping-screw 6. Said clamping-screw at its inner end is reduced in section, and on said reduced portion is loosely held the ring or ferrule 9, the same extending beyond the reduced portion of the screw, as shown in Fig. 4, said ring being adapted to engage the edge of the square-blade and by remaining stationary thereon as the screw is tightened prevent wearing of the edge by the screw.

The main body 10 of the straight-edged arm is, in the construction shown, made of wood and has a metallic pivot-head secured on the end thereof by suitable means. The said pivot-head is an integral body comprising a semicircular plate 11, having in the lower face thereof a curved groove 12, adapted to receive the arcuate tongue 7 of the clamping-head, and a stem portion consisting of the plate 13, secured to the under side of the main body 10, and the plate 14 secured to and forming a continuation of the working edge 15 of the body 10. The curved groove 12 in the plate 11 is so arranged with reference to the said working edge 15 that the center of the circle which would be formed by a continuation of the groove lies in the same plane as the said working edge. Thus when the pivot-head and the clamping-head are in assembled position with the arcuate tongue 7 engaging the curved groove 12, said center and the axis a of the arcuate tongue coincide with the line of intersection of the edge of the

square-blade and the said working edge of the arm. Said center or point of intersection, preferably, but not necessarily, is made the end of the working edge 15, and from the same as a starting-point the said edge is graduated, preferably in inches and subdivisions thereof, similar to the graduation of the square-blades, as shown in Fig. 2.

The clamping-head 2 and the pivot-head 10 of the straight-edged arm are operatively held together by the following: A threaded pin 16 is secured in the arcuate tongue 7 and extends upward therefrom through the curved slot 17 in the top of the groove 12, said slot being of an extent sufficient to permit movement of the pin through an arc of ninety degrees. On said threaded pin above the plate 11 is screwed the nut 18, having a recess therein, in which is placed the coil-spring 19, which normally bears on the washer 20 and holds the same in contact with the plate 11. By tightening the nut 18 the tongue 7 is drawn firmly into the groove 12, the tapering or wedge form thereof causing the same to bind tightly therein, and in addition thereto taking up any wear of the parts. When the nut is loosened, a slight tension is maintained by the spring 19, which is sufficient to hold the parts in engagement, but not enough to prevent relative movement thereof.

The outer edge 21 of the plate 11 may be graduated in degrees, as represented in Fig. 1, the scale of degrees being read from a line on the boss 8, which boss is of a height sufficient to make the top of the same and of the plate 11 on the same level. At suitable positions in the wood body 10 are placed the level-glasses 22 and 23, the former being adjusted to a position parallel with the graduated working edge 15 and the latter at right angles therewith. In the outer end of the body 10 are slots 25, arranged to slightly overlap each other, as shown in Fig. 1. Through one of said slots is passed the flattened pin 26, having a thin rounded head 27 at one end thereof and having the other end thereof threaded and the washer 28 and nut 29 placed thereon; as shown in detail in Fig. 6. The head 27 is adapted to pass under the short blade of the square 1, as indicated in Fig. 2, and by means of the nut 29, clamped thereon, to bind said blade and the straight-edged arm together.

In squares of the class described one side thereof is usually graduated in inches and twelfths of inches, as represented in Fig. 1, and I prefer to similarly graduate the working edge 15 of the straight-edged arm of my device, as shown in Fig. 2, said style of graduation furnishing a convenient scale for the proportional representation of feet and inches. Any other suitable proportional scale could, of course, be used, but the above is generally preferable and most convenient for the

greatest number of operations. Thus in the use of the device for determining the horizontal and plumb cuts and the lengths of rafters, where the run or horizontal projection and the rise or vertical projection thereof are known, the operation is as follows: The nut 18 is loosened and the straight-edged arm is turned to a position at right angles with the inner face of the flange 3 on the head 2. This is done in order to facilitate the reading of the graduations on the square-blade during the next step in the operation. The head 2 is then placed on the blade of the square in such position that the working edge 15 of the arm intersects the edge of the square-blade at a point thereon distant from the end of the blade as many inches and twelfths of inches as there are feet and inches, respectively, in the given run of the rafter, and the head clamped at such position on the blade by means of the screw 6. The arm is then turned to a position such that the working edge 15 intersects the edge of the other blade of the square at a point distant from the end thereof as many inches and twelfths of inches as there are feet and inches, respectively, in the given rise of the rafter, and the nut 18 is tightened to retain the arm in said position. The head 27 of the clamping-screw 26 is then placed below the latter blade of the square and the nut 29 tightened to clamp the same thereon. Owing to the coincidence, before mentioned, between the pivotal center of the arm, the working edge thereof, and the edge of the square-blade, it will be obvious that the adjustment first made will not be interfered with by the latter movement of the arm. With the arm adjusted to position on the square-blades, as described, it will be seen that, the lengths of the blades from the corner of the square to the points of intersection of the arm therewith being proportional to the run and rise of the rafter, the length of the edge 15 between the said points of intersection will be proportional to the length of the rafter, and as the graduations on said edge 15 commence with one of said points of intersection, the length of the rafter may be read directly on said graduated scale. With the same setting, by placing the edge 15 against the side of the timber, one blade of the square may be used to mark the plumb cut and the other blade to mark the horizontal cut of the rafter.

The operation of the device for determining the length of hypotenuse and the appropriate cutting angles of any right-angled triangular structure is similar to the foregoing. As an example, in laying out stairs the "tread" of a step determines the setting on one blade of the square and the rise of a step the setting on the other blade of the square, the total length of the runner being the product of the resulting hypotenuse by the number of steps. The scale of degrees

graduated on the edge 21 of the plate 11 may be used to obtain the settings for angles given in degrees and to compare angles so defined and angles given in terms of "run" and "rise." Structures may be placed at any desired angle with a horizontal or vertical line by setting the arm at the desired angle with one of the square-blades, placing the said blade of the square on the structure and adjusting the same until the arm is plumb or level as shown by the level-glasses thereon. It will be obvious that the arm when removed from the square may be used as an ordinary level and plumb.

Now, having described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination with a square of the class described of a head adjustably attachable to one blade of the square, a straight-edged arm, and an arcuate tongue and groove pivotally connecting the said head and arm, the pivotal center being at the intersecting edges of the arm and the square-blade to which the head is attached.

2. The combination with a square of the class described of a head adjustably attached to one blade of the square, an arcuate member on said head, a straight-edged arm,

means on said arm engaging said arcuate member to pivotally connect the arm with the head, the pivotal center being at the intersection of the working face of the arm and the edge of the square-blade to which the head is attached, and graduations on the said working face of the arm, the graduations starting from said pivotal center.

3. The combination with a square of the class described of a straight-edged arm carrying levels disposed at right angles to each other, one of the levels being parallel with the working face of the arm, a head adjustably connected with one blade of the square, and means forming a pivotal connection between the said arm and head, said connecting means lying entirely behind the working face of the arm, and the pivotal center being at the intersection of the said working face of the arm and the edge of the square-blade to which the head is attached.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

EMANUEL OEHRLE.

Witnesses:

D. O. BARNELL,
F. R. HEFT.