

(No Model.)

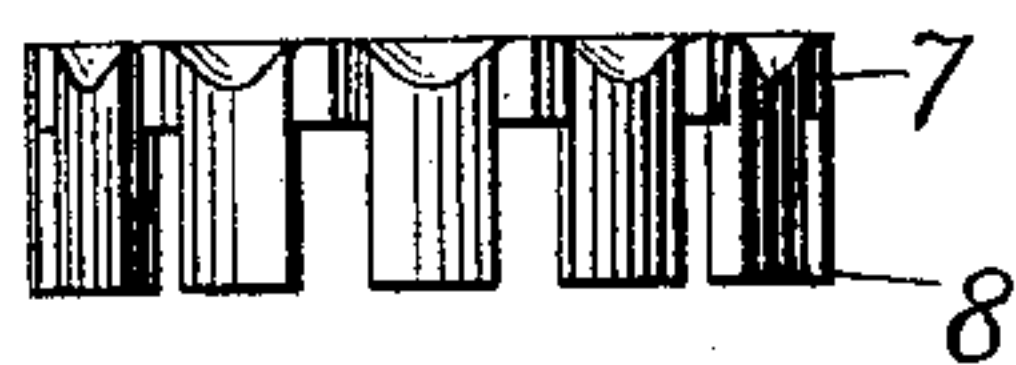
F. LAMBERT.

PROCESS OF FORMING THE TEETH OF FACE GEARING.

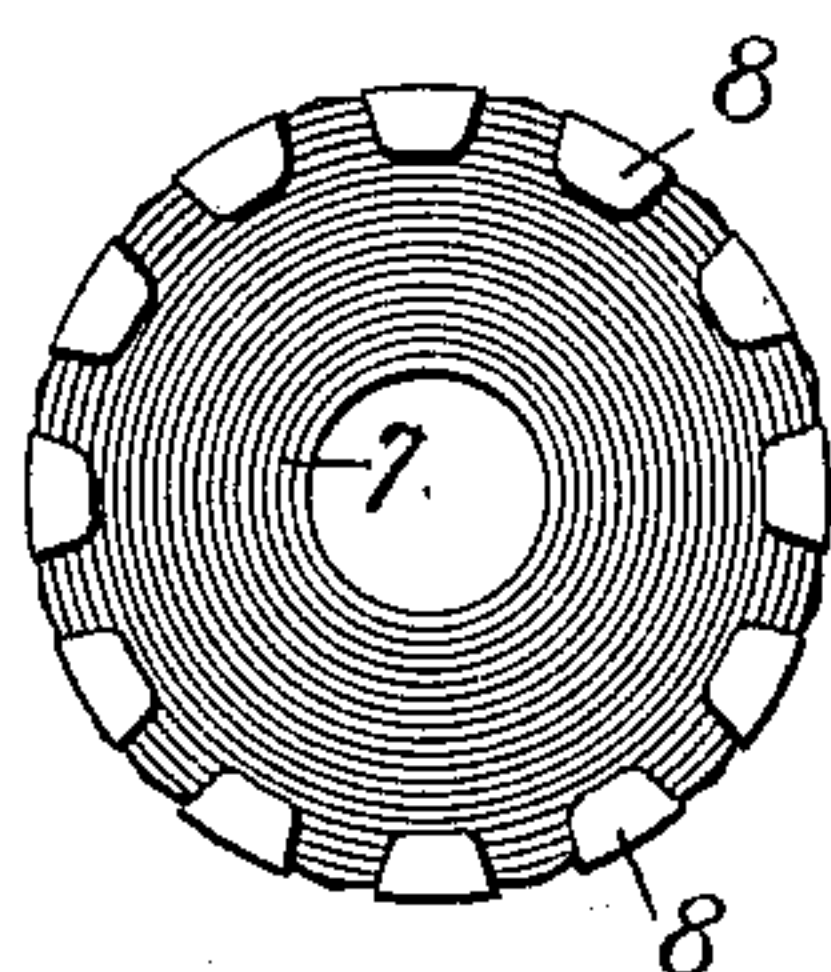
No. 452,480.

Patented May 19, 1891.

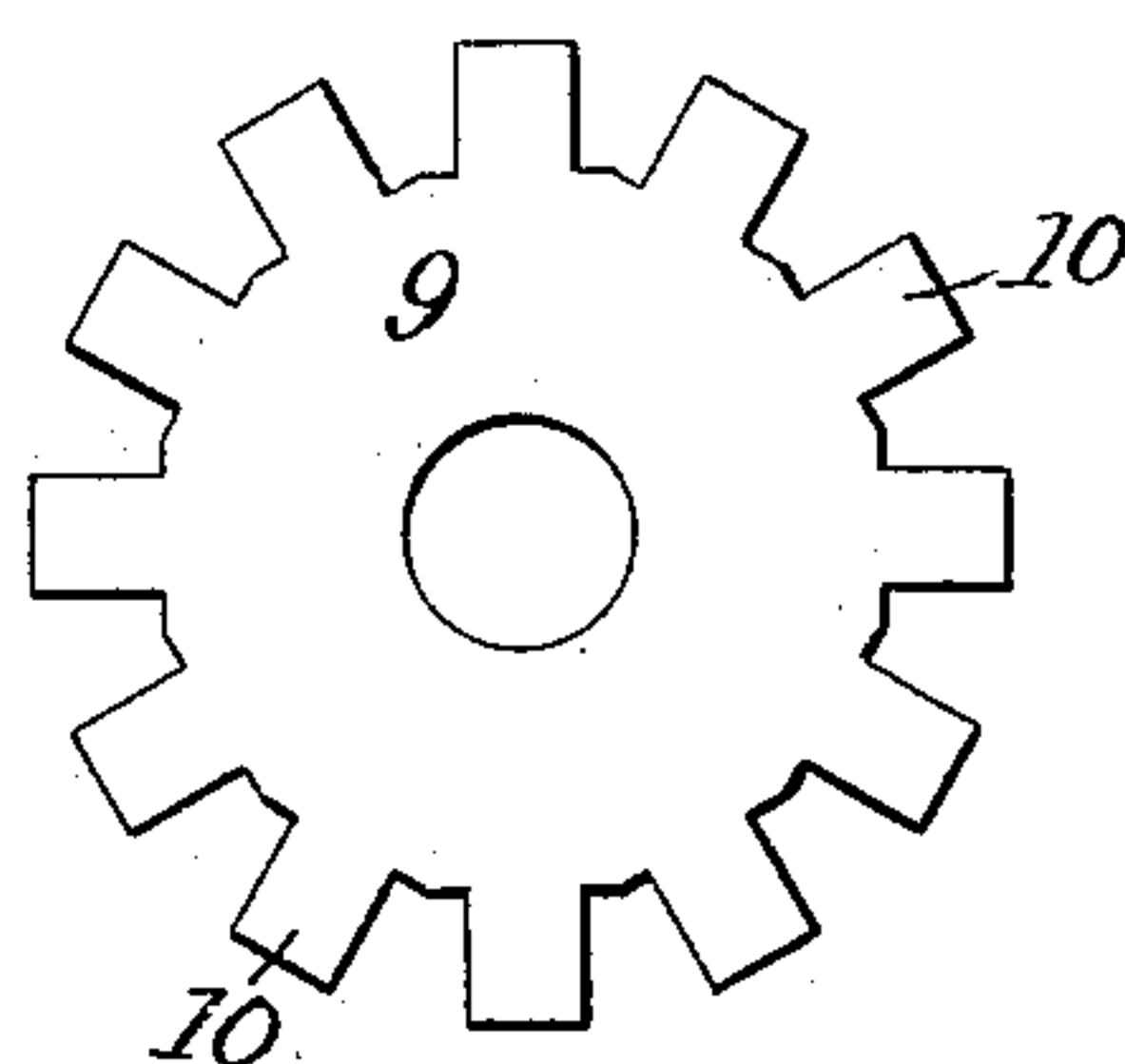
*Fig. 1,*



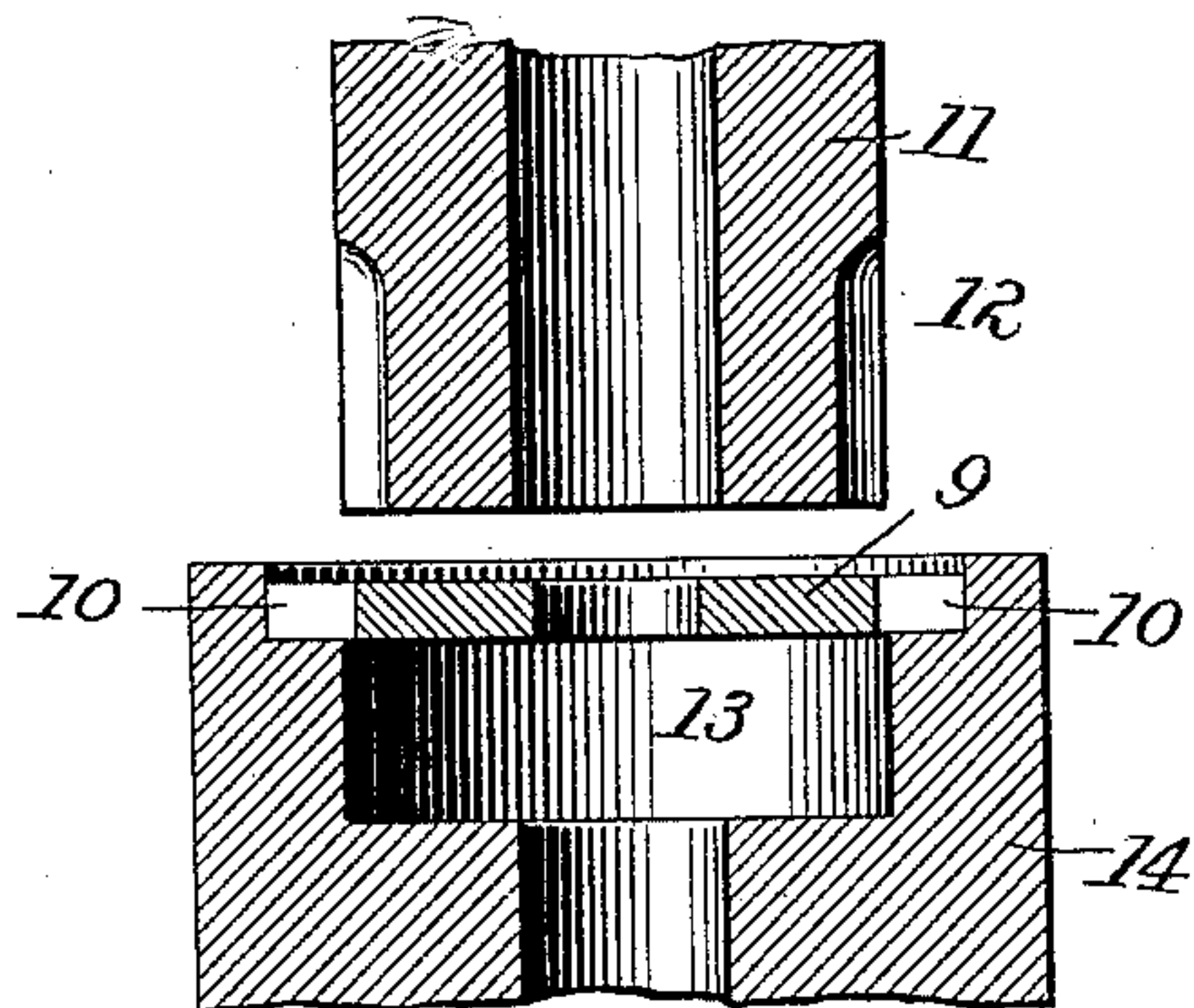
*Fig. 2,*



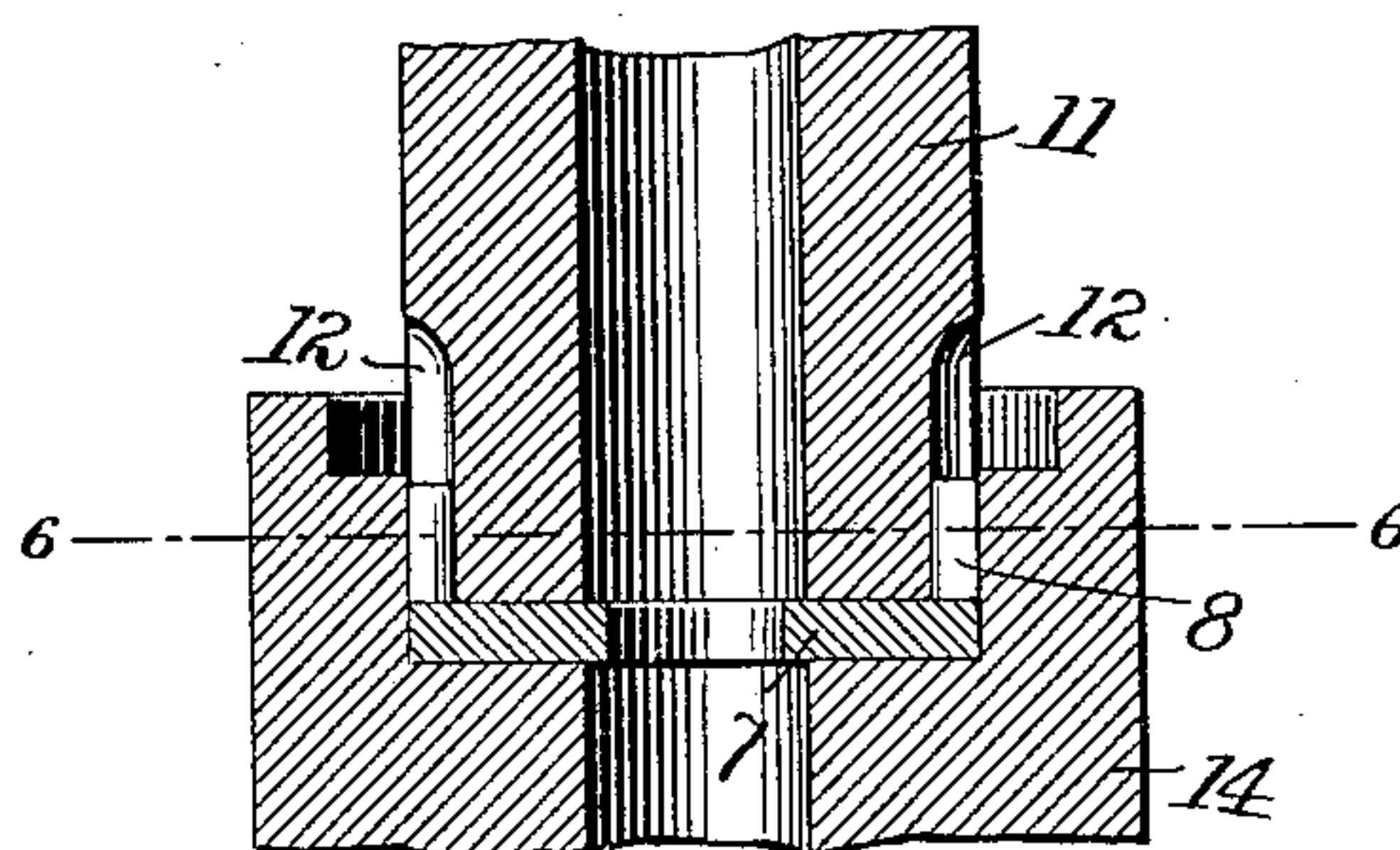
*Fig. 3,*



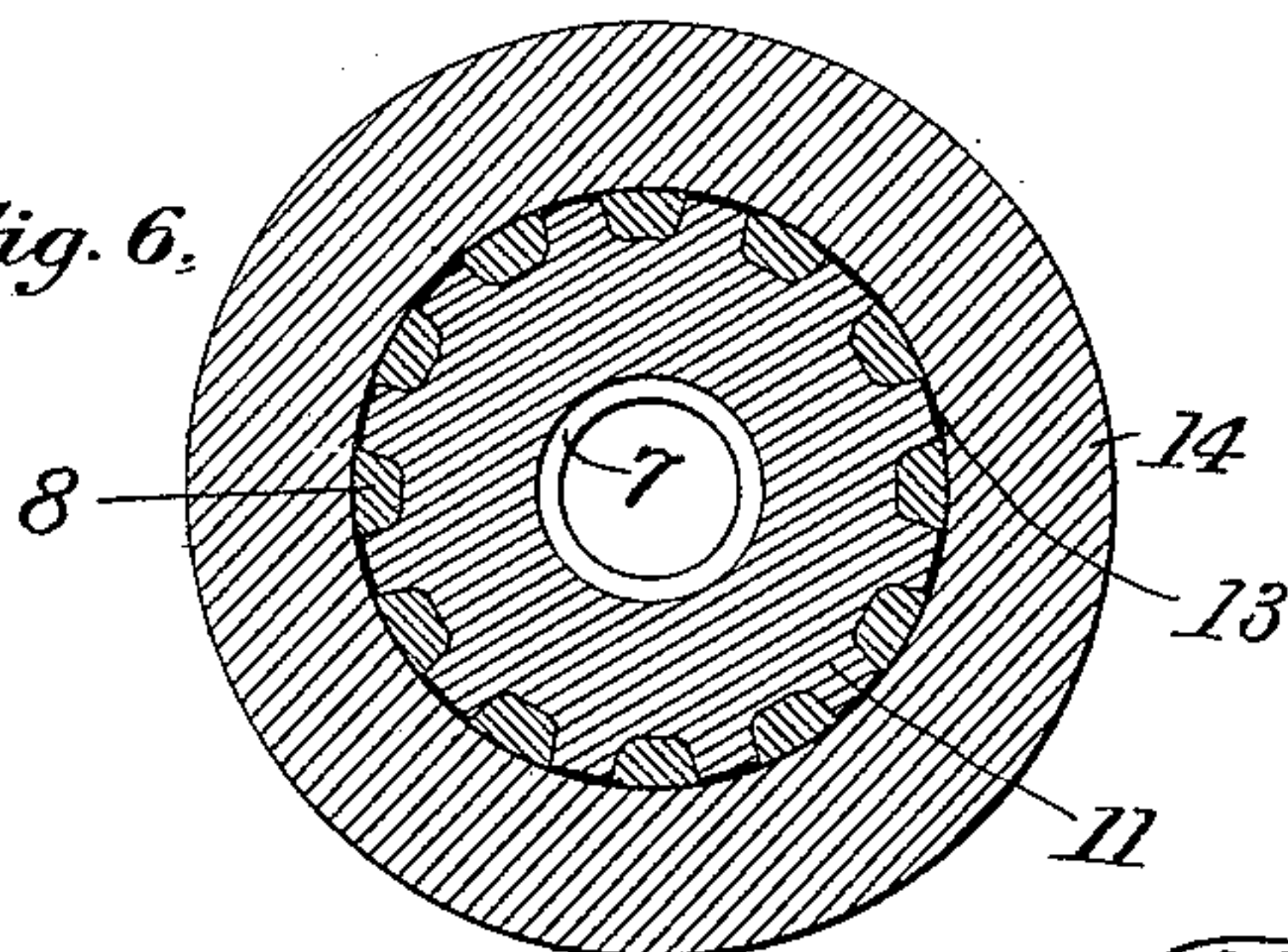
*Fig. 4,*



*Fig. 5,*



*Fig. 6,*



Witnesses  
Geo. W. Bruck  
Edward Thorpe.

Inventor:  
Frank Lambert



# UNITED STATES PATENT OFFICE.

FRANK LAMBERT, OF BROOKLYN, ASSIGNOR TO THE THOMSON METER COMPANY, OF NEW YORK, N. Y.

## PROCESS OF FORMING THE TEETH OF FACE-GEARING.

SPECIFICATION forming part of Letters Patent No. 452,480, dated May 19, 1891.

Application filed January 3, 1891. Serial No. 376,650. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK LAMBERT, a citizen of the Republic of France, residing at Brooklyn, Kings county, New York, have invented certain new and useful Improvements in the Process of Forming the Teeth of Face-Gearing, of which the following is a specification.

This invention is a process of forming the teeth of face-gearing, the object being to produce accurate and durable gear-teeth at low cost, as fully described hereinafter, and shown in the accompanying drawings, in which—

Figures 1 and 2 are an elevation and plan of a finished gear or pinion. Fig. 3 is a plan view of the blank, showing the preliminary stage of the process. Figs. 4 and 5 are vertical center sections of the punch and die with the blank and formed gear, respectively; and Fig. 6 is a horizontal section of Fig. 5 on line 6 6.

The present designation, "face-gearing," is that commonly given to gearing in which the teeth project from the blank at approximately a right angle thereto, and such gears are particularly applicable to clocks or registers.

I have preferably here illustrated the application of the process in the instance of a gear 7, having its teeth 8 adapted to an internal pinion or spur-wheel, as it is well known to be much more difficult and expensive to correctly form such teeth, particularly if of smaller diameter, than that of ordinary spur-gearing. This is ordinarily termed an "external gear." These objections are obviated by first punching or milling the edge of a metal disk 9 to form radial arms 10. A punch 11 is then provided in which vertical slots 12 are accurately formed, which in cross-section correspond to the contour of the teeth desired in the wheel. The punch is closely fitted in its external diameter to the cylindrical recess 13 of the die 14. The blank is then placed upon the die, Fig. 4, so that the aforesaid radial arms shall register or coincide with the

slots in the punch. Now upon applying pressure, Fig. 5, the arms are first upset to a right angle with the face of the disk, and then, second, forced to flow into the slots of the die, thereby accurately impressing the contour of the slots to the arms, which in fact are merged into teeth, and the gear is formed at a single operation.

A contingent advantage of this process is that the working-surfaces of the teeth are burnished and the metal compressed to a degree of smoothness and density not otherwise attainable. The original accurate construction of the punch is of ready accomplishment, as the slots may be formed by ordinary milling-gear cutters. The arms of the blank are shorter than the teeth of the produced gear, as the excess of metal in the arms is forced to flow upward into the slots; but gears or pinions so produced are very uniform one with the other, and usually do not require any additional machining.

It will be evident that by a simple inversion of conditions, as by forming the slots in either the die or the punch, or in both, this process or mode is equally applicable to the production of spur-gears when face-gearing in such form may be used, in the instance, say, of "lantern" pinions for clocks.

Without limiting myself to the precise means shown, I claim—

In the manufacture of face-gearing, the method, substantially as hereinbefore described, consisting in first forming a blank with radial arms and then bending the arms at right angles to the body of the blank and simultaneously compressing the arms, causing the metal to flow under pressure to impart the desired contour to the teeth.

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

FRANK LAMBERT.

Witnesses:

JOHN THORNTON,  
EDWD. K. ANDERTON.