

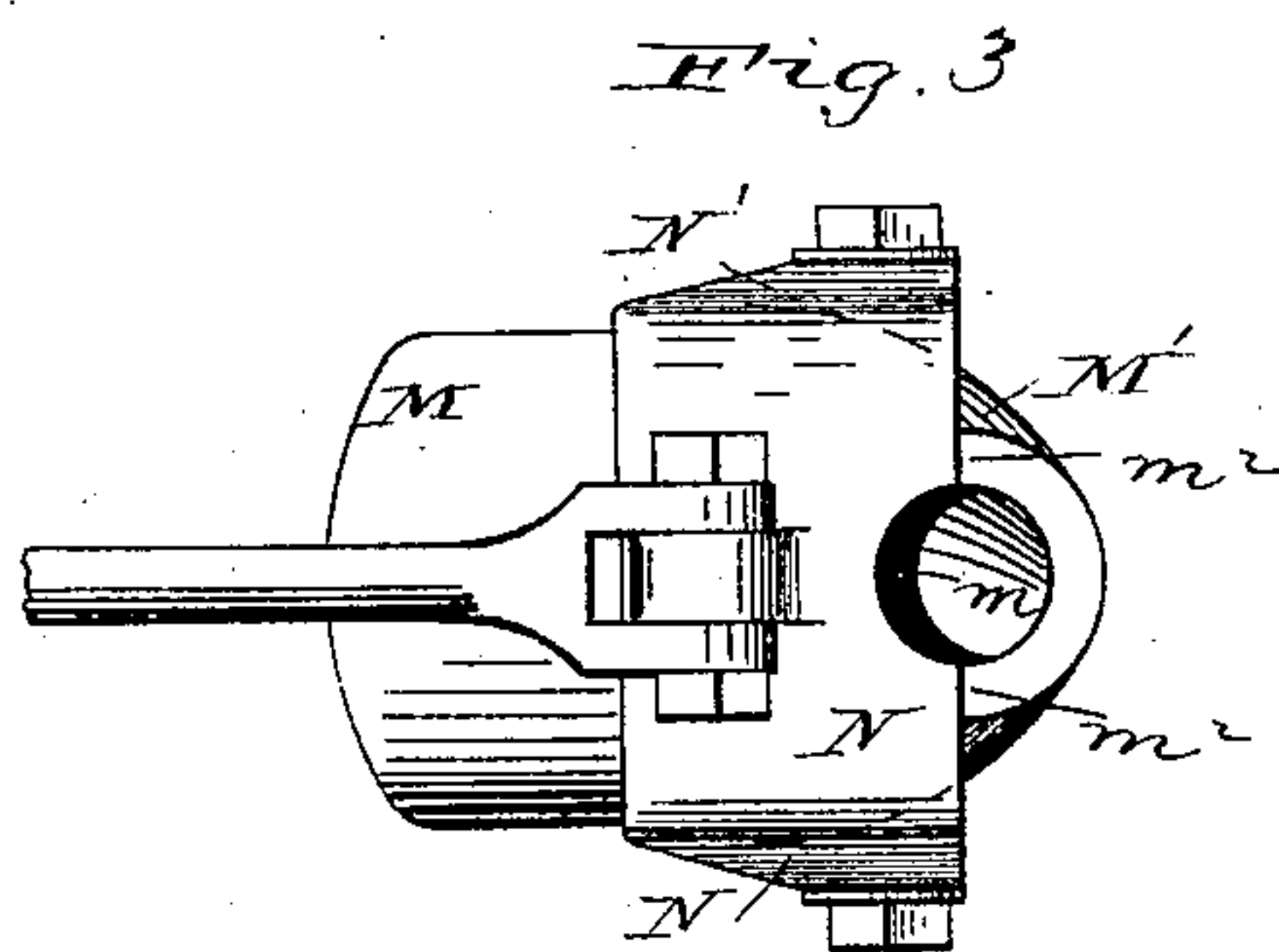
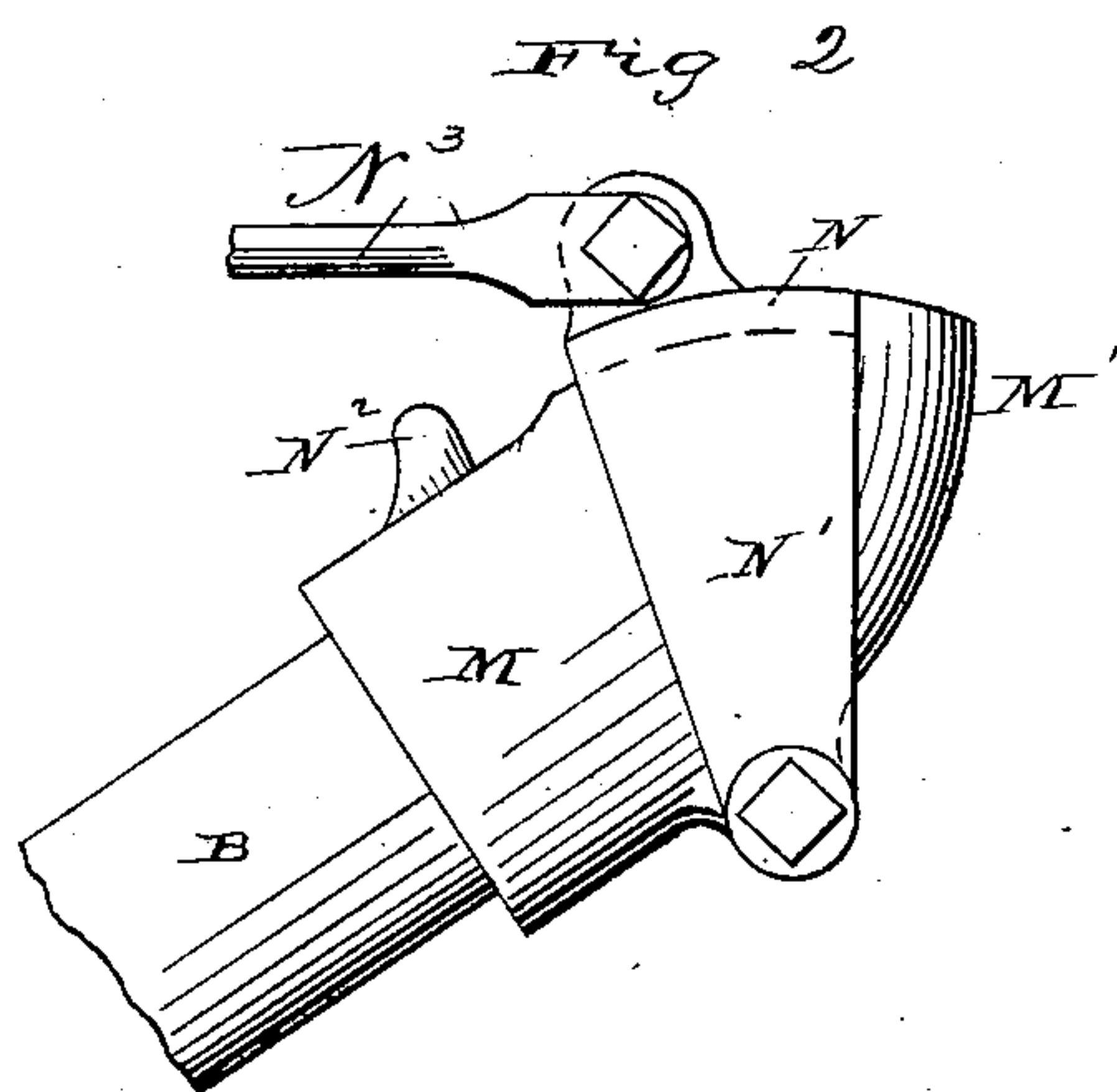
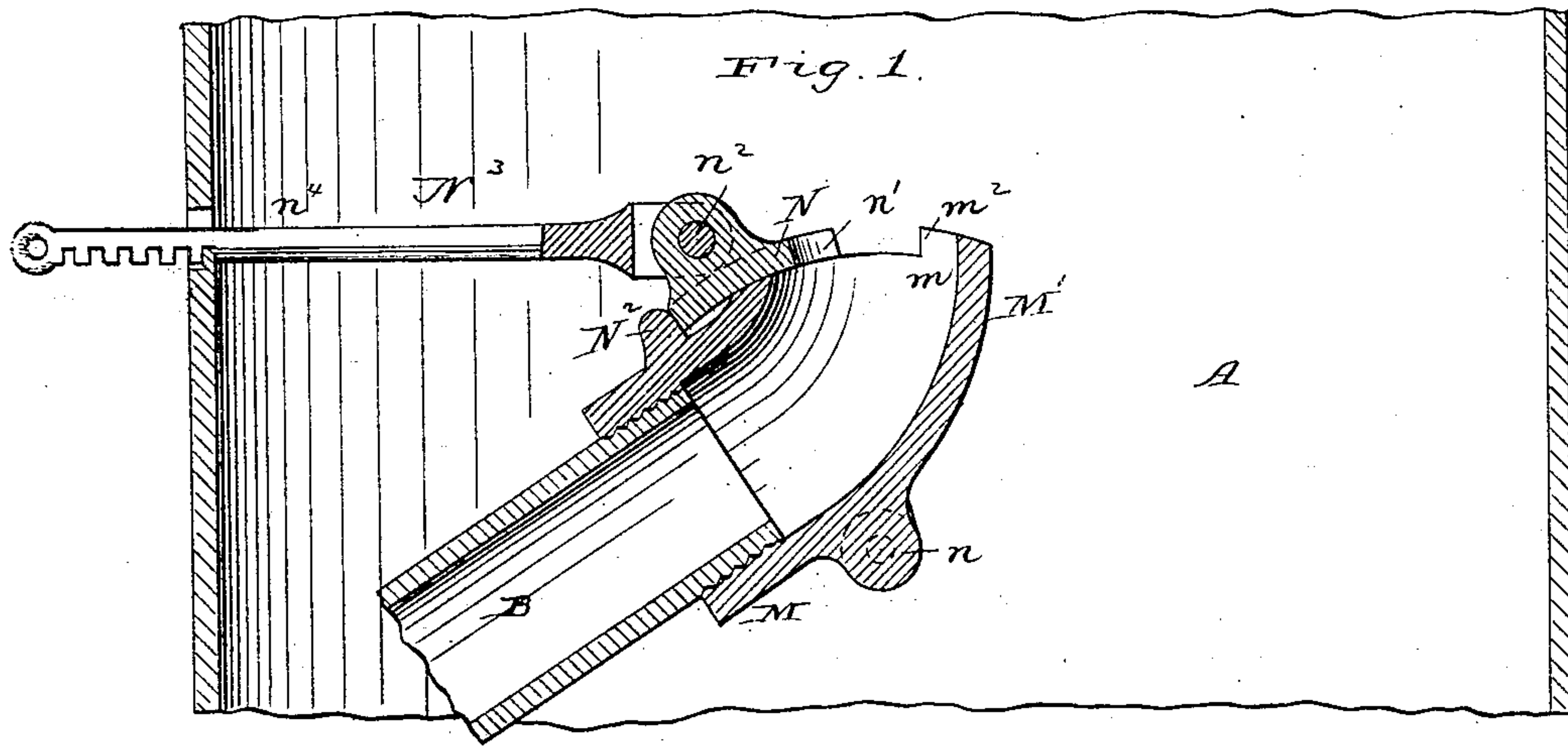
(No Model.)

W. A. CLARKE.

EXHAUST NOZZLE FOR STEAM ENGINES.

No. 270,743.

Patented Jan. 16, 1883.



Witnesses:

H. N. Low

A. J. Houghton

Inventor:

Willard A. Clarke  
by Doubleday & Bliss  
attys.

# UNITED STATES PATENT OFFICE.

WILLARD A. CLARKE, OF STILLWATER, MINN., ASSIGNOR TO THE NORTH-WESTERN MANUFACTURING AND CAR COMPANY, OF SAME PLACE.

## EXHAUST-NOZZLE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 270,743, dated January 16, 1883.

Application filed November 13, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, WILLARD A. CLARKE, a citizen of the United States, residing at Stillwater, in the county of Washington and State of Minnesota, have invented certain new and useful Improvements in Exhaust-Nozzles for Steam-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

The purpose of this invention is to provide a simple but effective means for narrowing the escape-orifice of the exhaust-pipe of an engine, so that the steam shall be caused to pass out in a small strong jet in order to cause a sharp current of air through the furnace.

Figure 1 is a vertical section of the smoke-stack and of such of the parts of an engine as are necessary to illustrate the method of applying my invention. Fig. 2 is a face view of the nozzle detached. Fig. 3 is a top view of the same.

In the drawings, A represents the smoke-stack of the engine, and B the exhaust-pipe, extending from the feed-water heater or from the steam-chest direct, the parts mentioned being of any preferred character. Upon that end of the exhaust-pipe which is situated within the smoke-stack I place an improved nozzle, adapted to have the escape-orifice narrowed or contracted, so as to vary the size of the jet. This nozzle consists of the tubular part M and the tapering portion M'. The tubular part M is provided with a screw-thread for fastening it to the upper end of the exhaust-pipe B. The tapering portion M' is provided with a narrow escape throat or orifice, preferably having rounded ends, as shown. The escape-orifice is elongated, its sides preferably being substantially parallel at the central parts and converging or rounded at the ends. The shape will be readily understood by comparing Figs. 1 and 3.

N is a cut-off or valve carried by and preferably formed with two legs, N' N', which latter are pivoted to the rib or projection n, which is cast with the part M'.

n' is a recess formed in the edge of the valve

or cut-off N, corresponding in position with the throat or escape orifice M. The play of the valve or cut-off is regulated in one direction by a lug or ear, N<sup>2</sup>, cast upon the part M, and in the other by shoulders m<sup>2</sup> m<sup>2</sup>, formed upon the part M'. When the valve or cut-off N is moved upward the steam is compelled to escape through the throat or passage-way m, as will be readily understood, in a comparatively strong jet, which causes a sharp draft in the smoke-stack. The recess n' and the end of the throat m are of such a shape as to make a circular or nearly circular aperture when the valve is thrown up, and through an aperture of such shape the steam escapes to the greatest advantage to produce a sharp strong blast.

N<sup>3</sup> is a rod, pivoted at n<sup>2</sup> to the valve N. This rod passes out through an aperture at n<sup>4</sup> in the smoke-stack. The under side of the rod is notched, as shown at n<sup>5</sup>. By means of these devices the valve can be adjusted to any desired position and held there, as the suitable notch at n<sup>5</sup> can be engaged with the wall of the smoke-stack to hold the rod firmly.

I am aware that heretofore use has been made of valves arranged to slide rectilinearly upon the top of the exhaust-nozzle; but much trouble is experienced in using such valves, from the fact that they corrode when water is forced through the pipes into the smoke-stack, and become rusted and firmly fastened in their seats, and it is difficult and often impossible to move them. When they are supported upon a hinge in the manner which I have shown, and combined with a curved seat, the hinge being at a distance comparatively from the valve, the latter can be started much more easily than when the valve moves rectilinearly.

What I claim is—

1. The combination, with the smoke-stack and exhaust-pipe, of the herein-described nozzle having the aperture m, and the pivoted valve N, arranged to narrow said aperture, substantially as set forth.

2. The combination, with the nozzle having



the elongated throat or slot  $m$  and the lugs or shoulders  $m^2$   $m^2$ , of the valve or cut-off having legs  $N'$ , and the recess  $n'$ , substantially as set forth.

- 5 3. The combination of the curved valve-seat, the hinged valve, the rod pivoted to the valve and projecting through the side of the smoke-stack, and the devices for fastening the

rod in different positions for adjusting the valve, substantially as set forth. 10

In testimony whereof I affix my signature in presence of two witnesses.

WILLARD A. CLARKE.

Witnesses:

L. C. PROCTOR,

H. N. MCKUSICK.