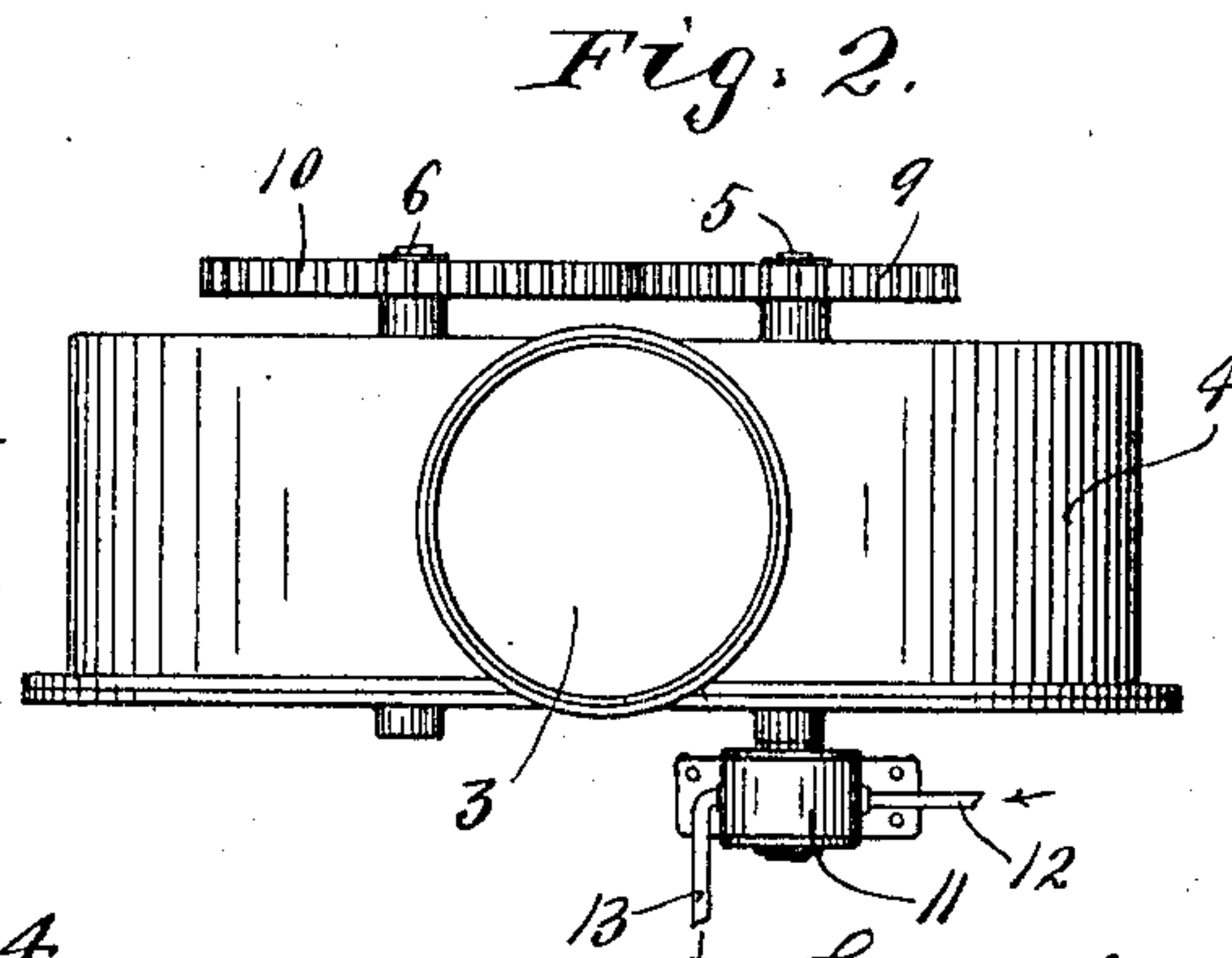
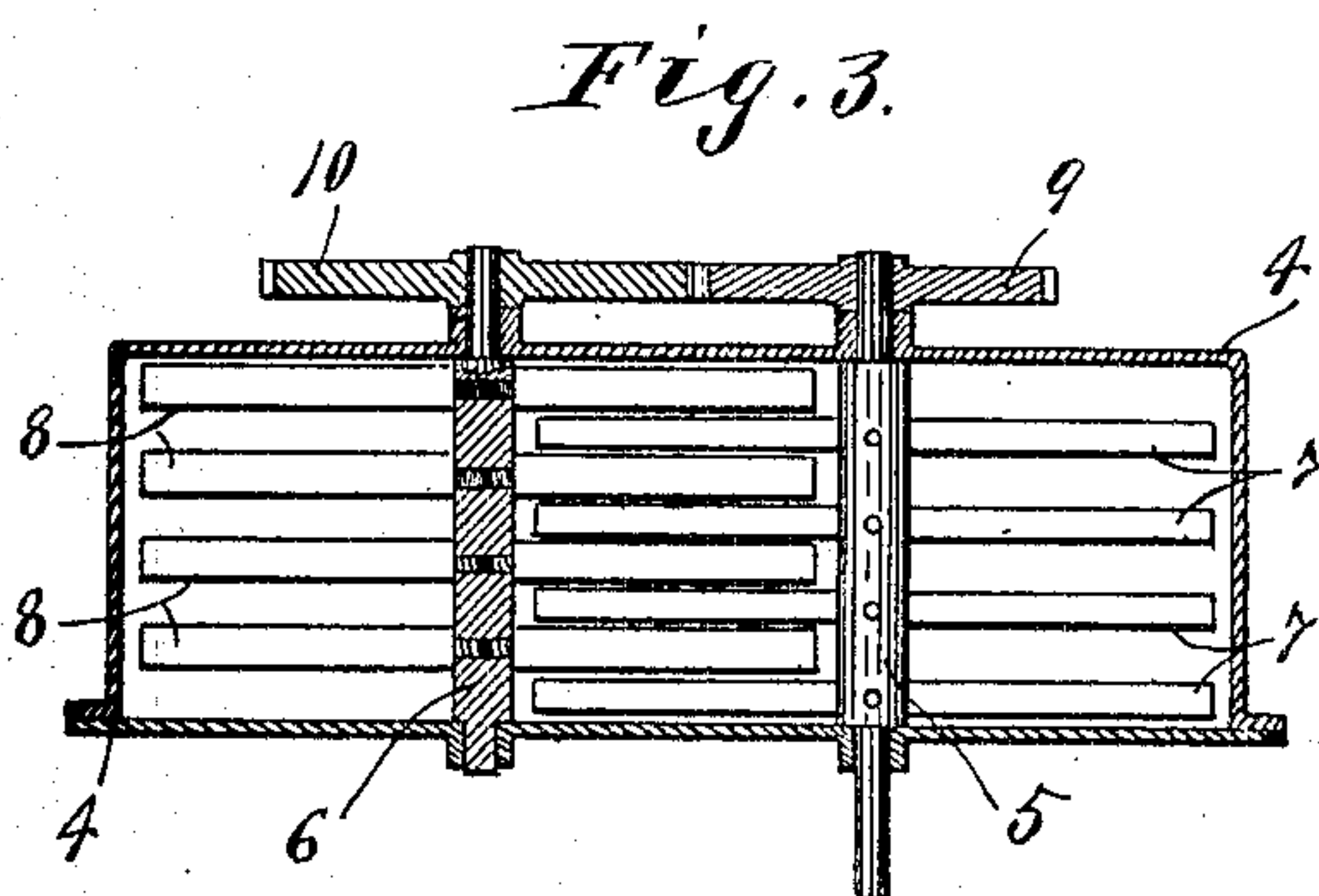
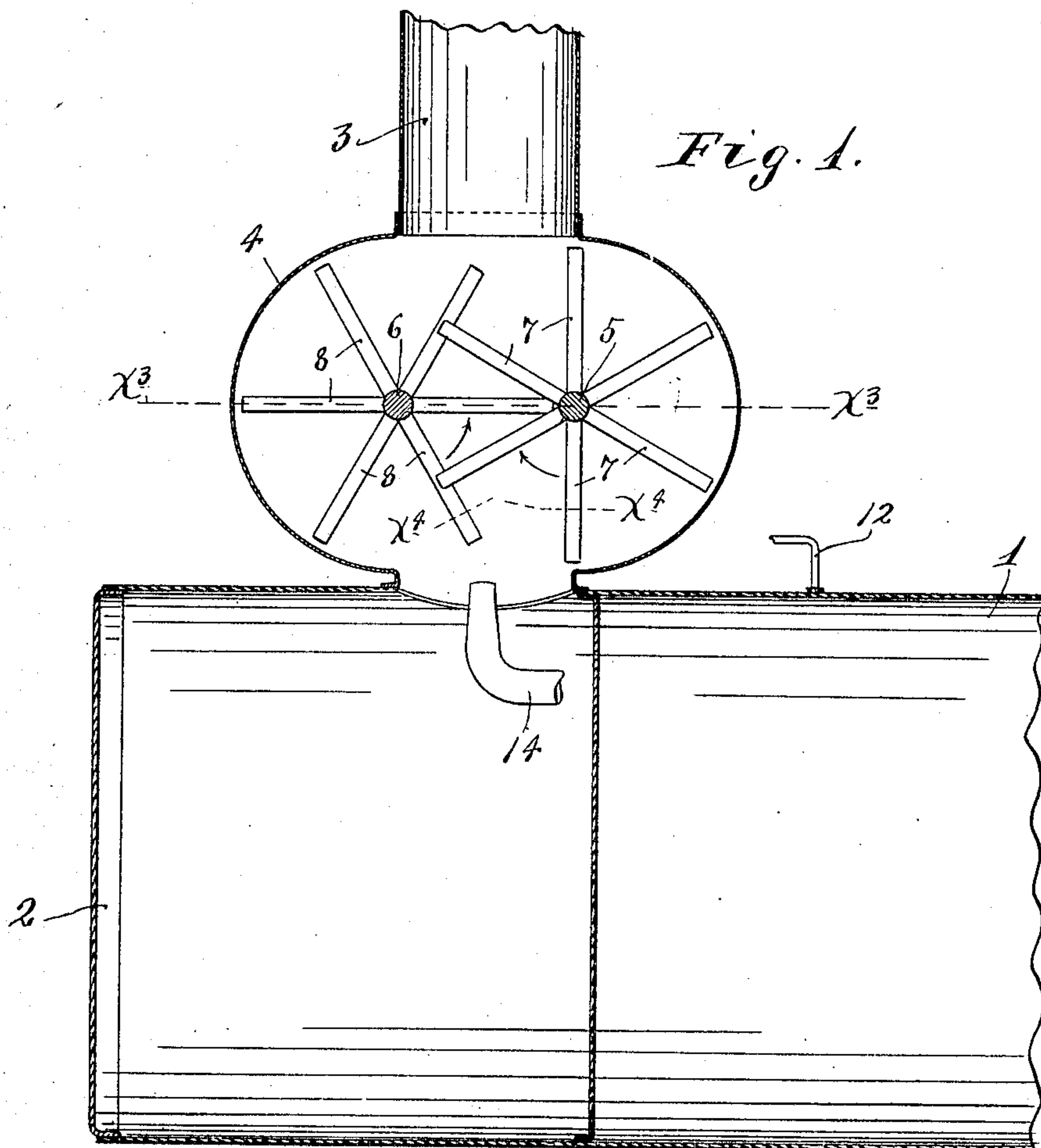


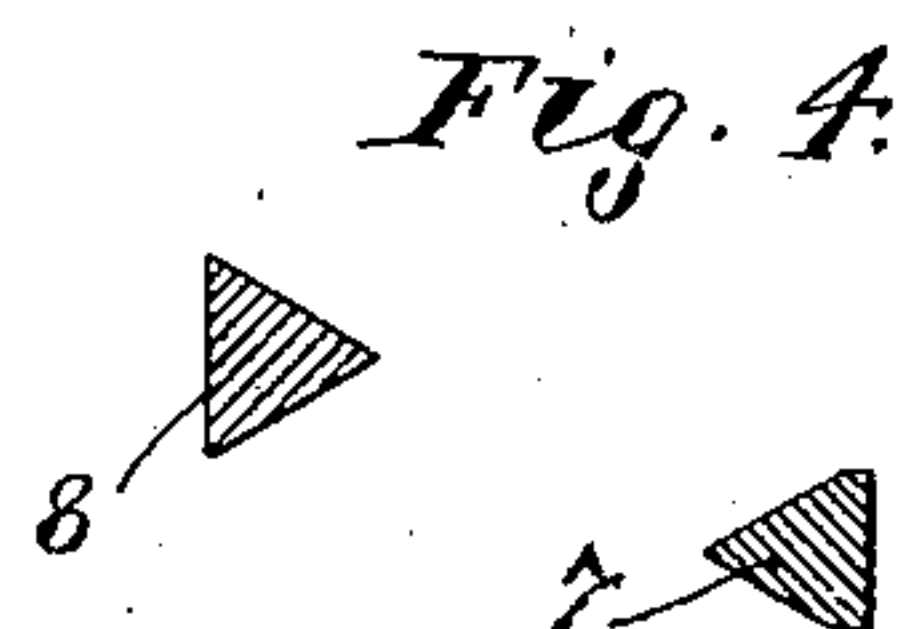
No. 872,072.

PATENTED NOV. 26, 1907.

F. J. LYMAN.
SPARK DESTROYER FOR SMOKE STACKS.
APPLICATION FILED AUG. 8, 1906.



Witnesses:
a. H. Opsahl
H. D. Kilgore.



Inventor:
Frank J. Lyman.
By his Attorneys
Williamson Muehant.

UNITED STATES PATENT OFFICE.

FRANK J. LYMAN, OF MINOT, NORTH DAKOTA.

SPARK-DESTROYER FOR SMOKE-STACKS.

No. 872,072.

Specification of Letters Patent.

Patented Nov. 26, 1907.

Application filed August 8, 1906. Serial No. 329,689.

To all whom it may concern:

Be it known that I, FRANK J. LYMAN, a citizen of the United States, residing at Minot, in the county of Ward and State of North Dakota, have invented certain new and useful Improvements in Spark-Destroyers for Smoke-Stacks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its primary object to provide a spark destroying device adapted for application to the smoke stacks of engines, and to this end it consists of the novel devices and combinations of devices hereinafter described and defined in the claims. The improved device also acts as a forced draft device, but this is secondary to its main purpose.

The improved device is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a view in vertical section, showing the smoke box end of a boiler, and showing my improved spark destroying device applied in the smoke stack thereof. Fig. 2 shows the smoke stack and spark destroying device in plan view. Fig. 3 is a horizontal section taken on the line $x^3 x^3$ of Fig. 1; and Fig. 4 is an enlarged detail in approximately horizontal section taken on the irregular line $x^4 x^4$ of Fig. 1, some parts being removed.

The boiler shown is a horizontal boiler, the body thereof being indicated by the numeral 1; the smoke box being indicated by the numeral 2, and the smoke stack thereof being indicated by the numeral 3.

In the application of my invention to the smoke stack, an oblong casing 4 is interposed therein, just above the smoke box 2, the said casing 4, as shown and preferred, having parallel, vertical side walls. A pair of parallel laterally spaced shafts 5 and 6 extend through and are journaled in the sides of the casing 4, said shafts, as shown, having reduced ends or trunnions. The said shafts 5 and 6 are provided, respectively, with long projecting arms or teeth 7 and 8 which, in the preferred form of the device, are approximately triangular in cross section, as best shown in Fig. 4. The arms 7 8 of the two shafts are arranged to run very closely together and their sharp edges are so arranged

that they are projected downward when they are moved upward between the two shafts, as indicated by the arrows marked on Fig. 1. The trunnions of the shafts 5 and 6 that project at one side of the case are provided, respectively, with spur gears 9 and 10, the former of which, as shown, is smaller than the latter, so that the two arm-equipped shafts will be rotated in reverse directions at slightly different speeds. As a means for positively rotating the arm-equipped shafts, a steam actuated rotary motor 11 of any suitable construction is shown as applied on one end of the shaft 5.

The numeral 12 indicates a steam supply pipe which leads from the boiler to the casing of the motor 11, and the numeral 13 indicates an exhaust pipe which leads from said casing to any suitable point of exhaust.

The numeral 14 indicates the exhaust nozzle of the engine, the said engine being assumed to be either a locomotive or a traction engine. This exhaust nozzle, as is usual, is positioned to discharge the exhausted steam into the base of the smoke stack 3. Hence, in this improved arrangement, said exhaust nozzle is positioned to discharge directly on the arms of the two rotary shafts. The said shafts, so-called, because they are small, might nevertheless be much larger in diameter, in which case they might be designated as drums.

The axes of the shafts 5 and 6, it will be noted, are located approximately in line with the corresponding sides of the stack 3 so that the passage between the two shafts is fully as large as the discharge passage of the stack.

The action of the improved device is substantially as follows: The arm-equipped shafts are kept under high rotation at slightly different speeds so that all burning particles or sparks which pass through the stack will come into contact with the arms thereof, and will be ground or broken into small particles, by the sharp edges of the arms of the two shafts, as said arms pass one another traveling at different speeds, so that the sparks will become dead or cold before they leave the stack and, hence, cannot possibly set fire to dry grass or any other objects in the vicinity thereof. Under the rotation of the arm equipped shafts, an upward draft is produced in the stack, and by regulating the speed of said device, the amount of forced draft produced may be varied or regulated as desired. So far as the broad idea of

my invention is concerned, the said arm equipped shafts may be rotated by any suitable means. They would be rotated to a considerable extent by the exhaust from the
5 nozzle 14, and in some cases this might be found sufficient. Nevertheless, it is very desirable to positively rotate the said arm shafts by means of a motor or other engine driven part. With the arms of the shafts
10 formed triangular, or with sharp lower edges, any cinders or burning material striking against the arms will be deflected against other arms of the shafts, and passing between the arms will be ground or crushed into small
15 particles, as before stated.

What I claim is:

1. The combination with an engine boiler, of a pair of rotary spark destroying devices
20 of, and having radially arranged and laterally spaced interlapping arms and gears of different diameters connecting said rotary

devices for rotary movements in opposite directions at different speeds, and means for positively rotating said devices, substan- 25
tially as described.

2. The combination with an engine boiler, of a pair of rotary spark destroying devices mounted in the smoke outlet passage there- 30
of, and having radially arranged and laterally spaced interlapping arms approximately triangular in cross section and having their sharp edges turned in the direction of rotation, gears of different diameters connecting
35 said rotary devices for rotary movements in opposite directions at different speeds, and means for positively rotating said devices, substantially as described.

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

FRANK J. LYMAN.

Witnesses:

MALIE HOEL,
F. D. MERCHANT.