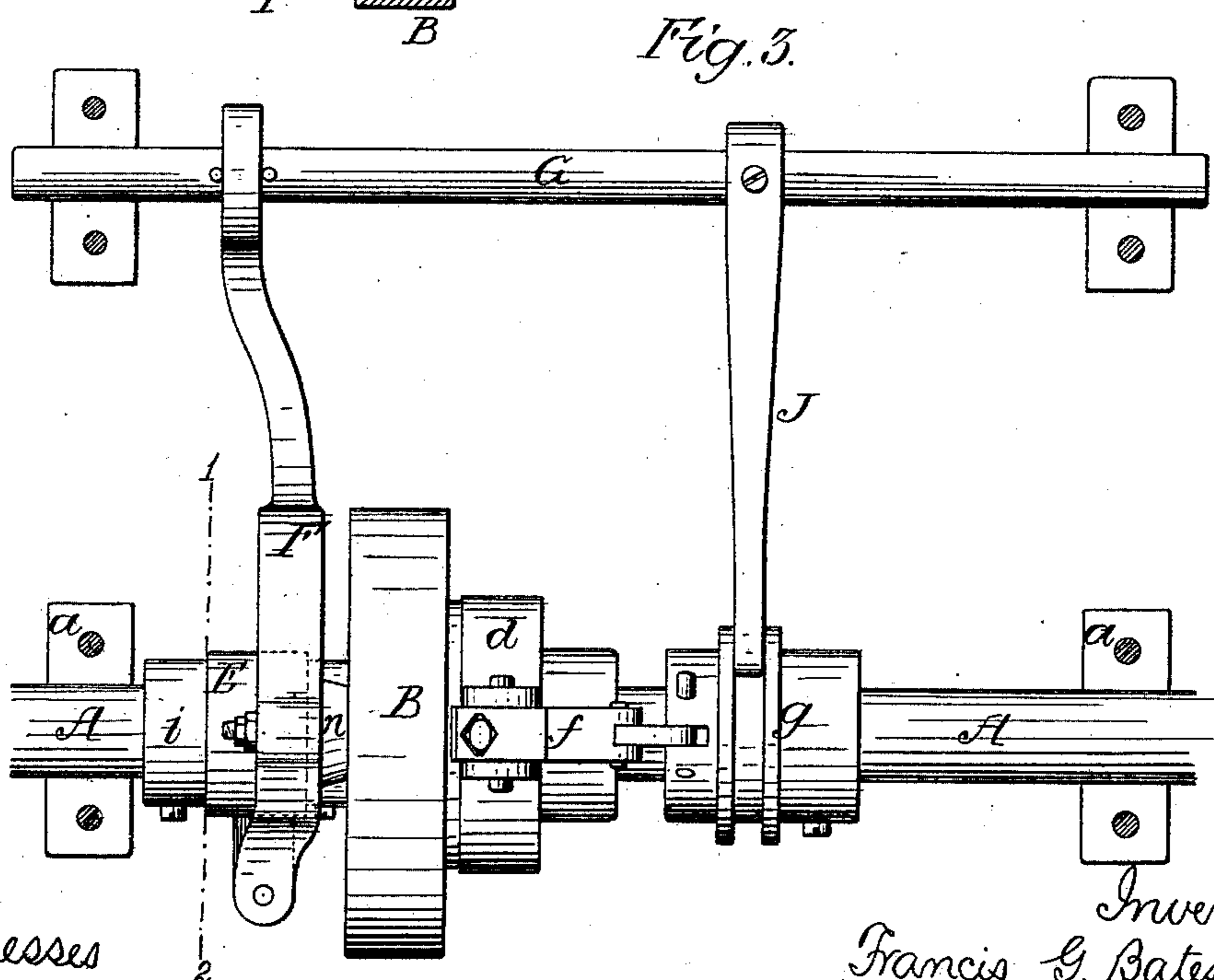
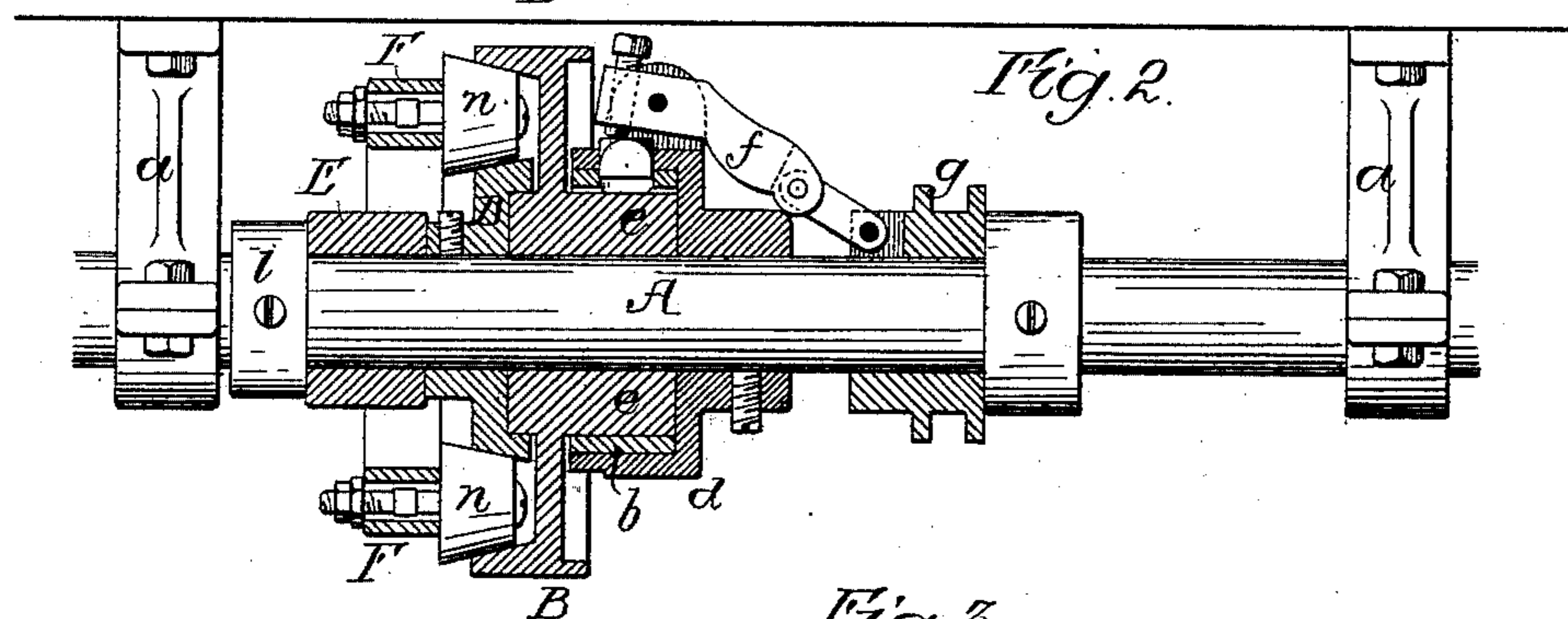
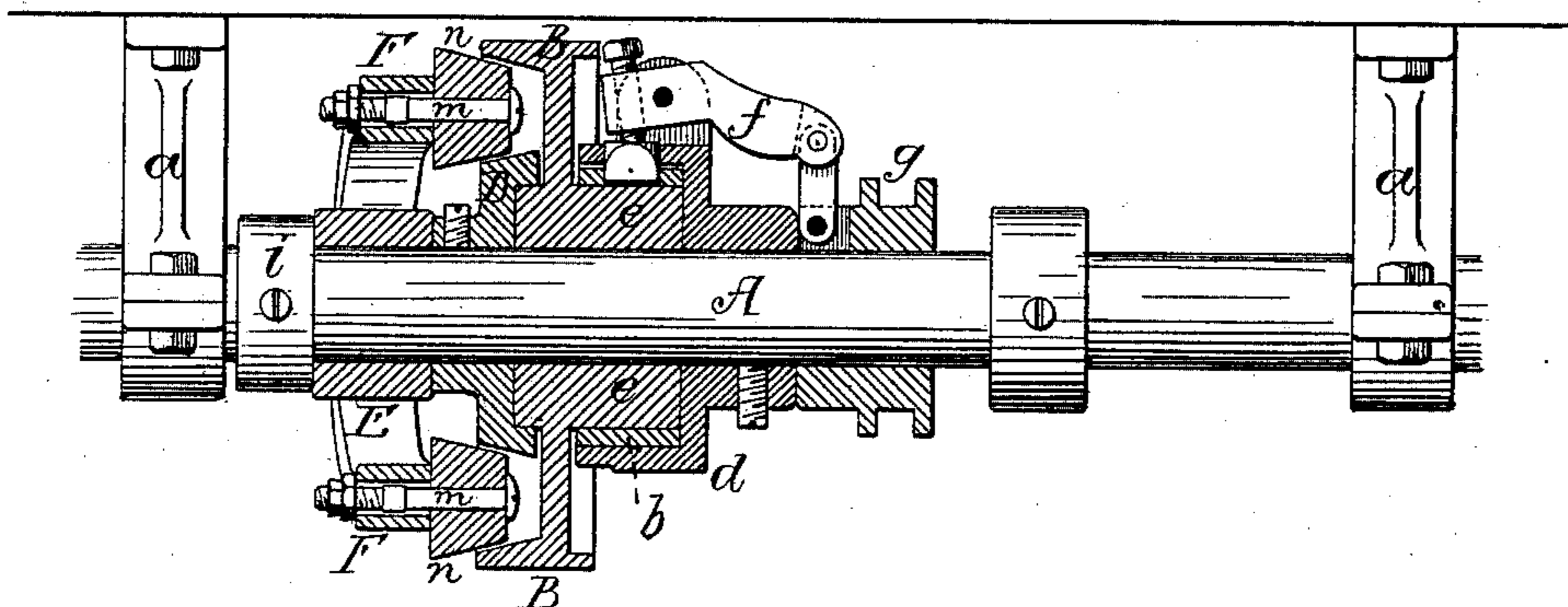


F. G. BATES & W. C. HARTMANN.  
Device for Driving, Stopping, and Reversing Shafts,  
Wheels, or Pulleys.

No. 223,097.

Patented Dec. 30, 1879.



Witnesses

Henry Howson Jr

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Inventors  
Francis G. Bates  
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William C. Hartmann  
by their Attorneys  
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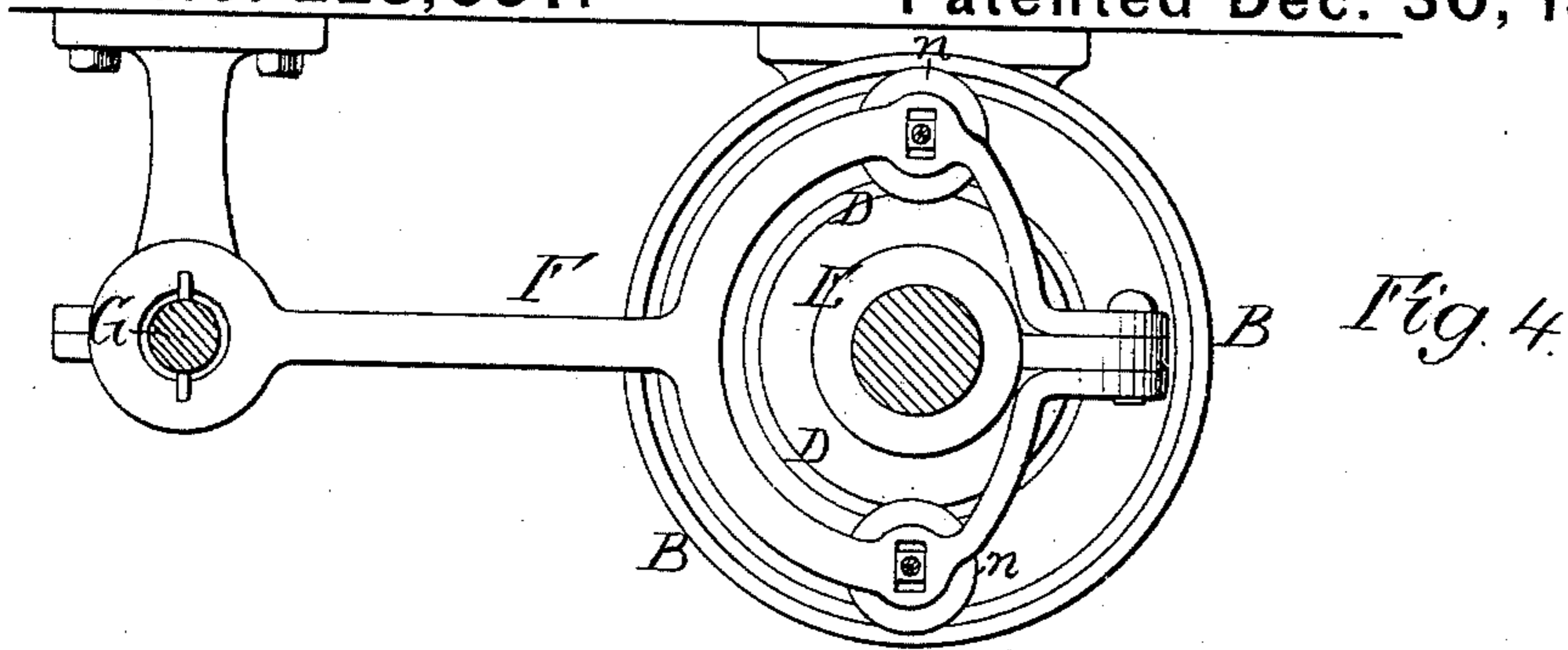


Fig 5.

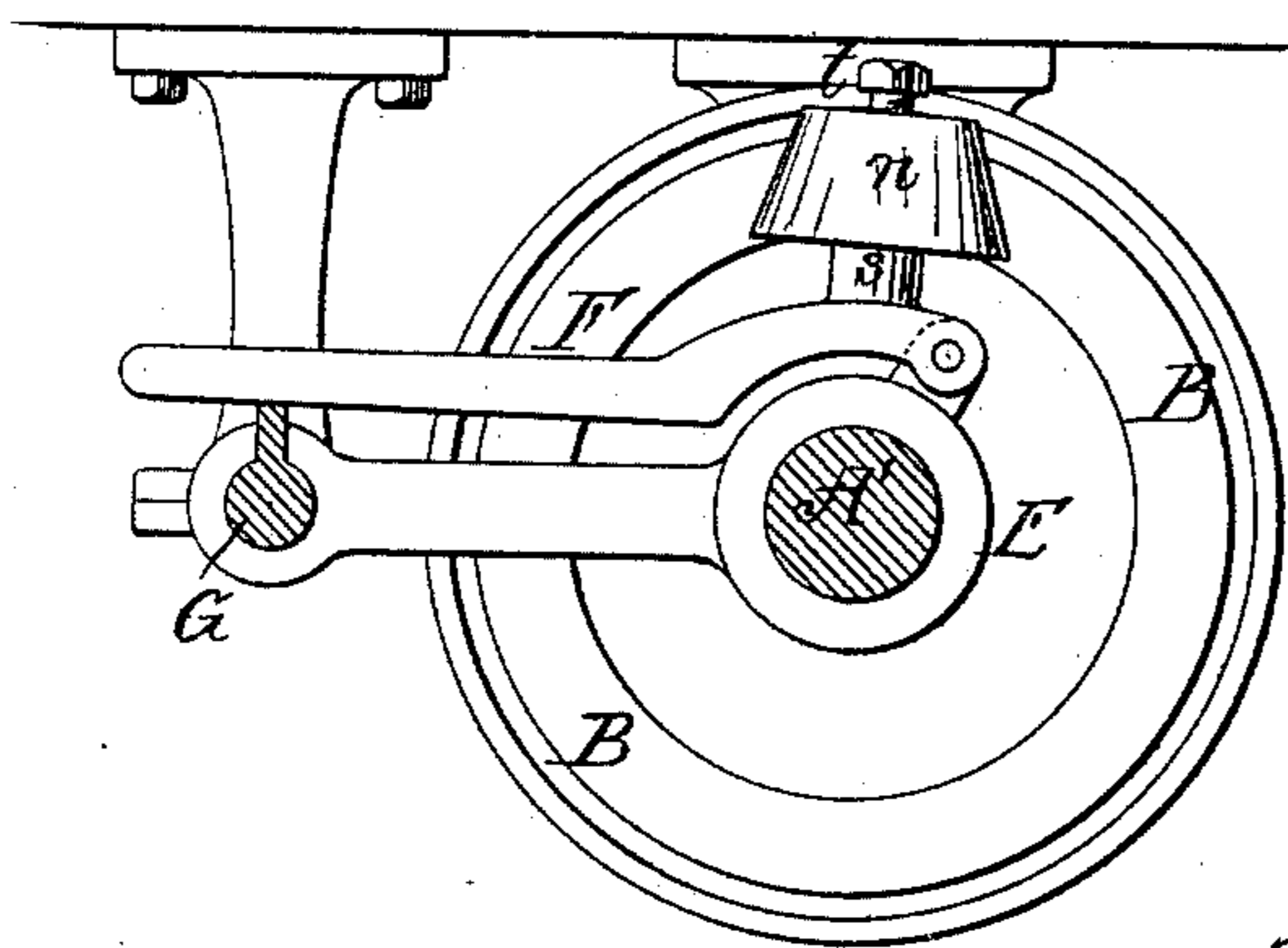
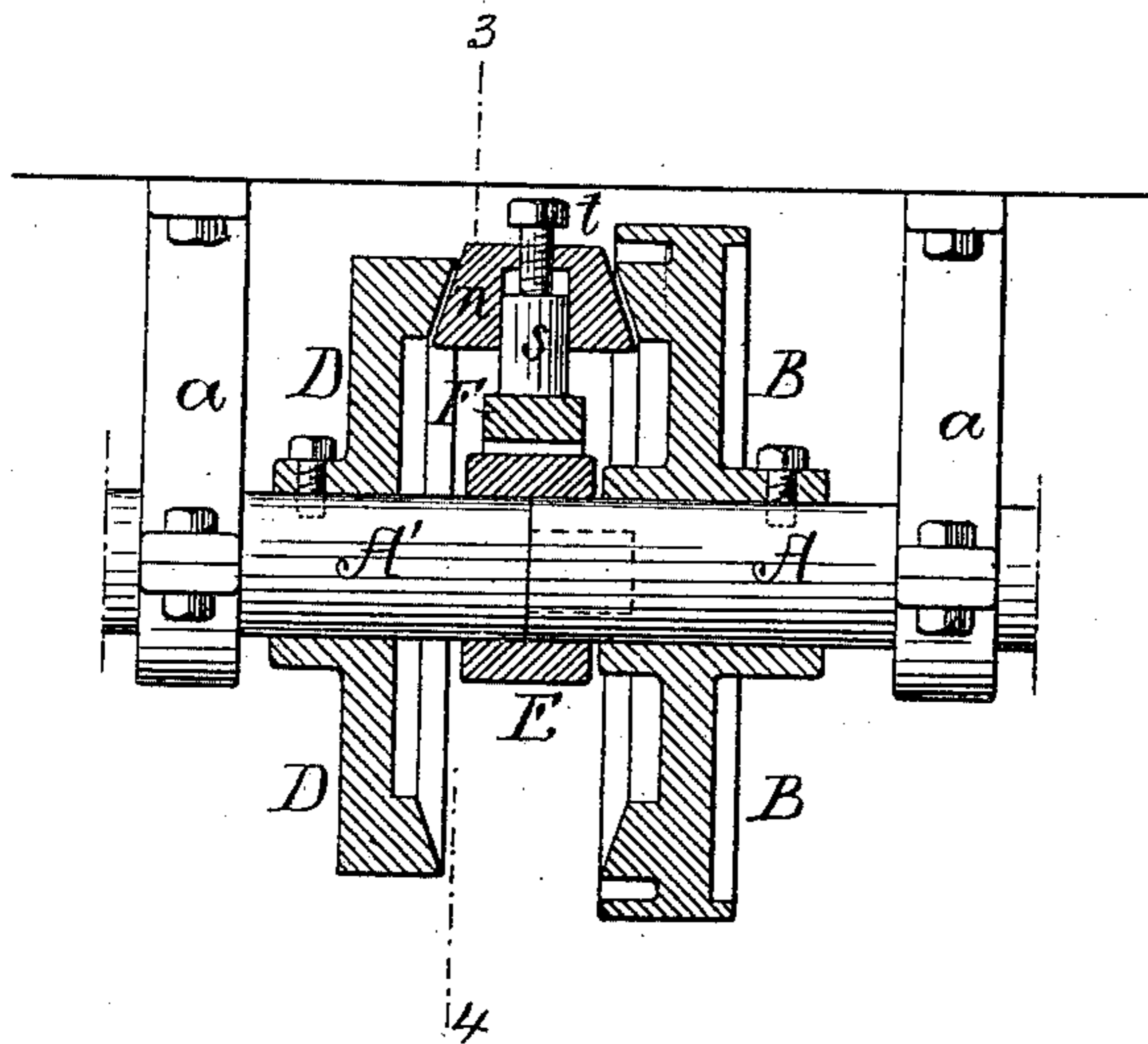


Fig. 6.

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# UNITED STATES PATENT OFFICE.

FRANCIS G. BATES AND WILLIAM C. HARTMANN, OF PHILADELPHIA, PA.

IMPROVEMENT IN DEVICES FOR DRIVING, STOPPING, AND REVERSING SHAFTS, WHEELS, OR PULLEYS.

Specification forming part of Letters Patent No. **223,097**, dated December 30, 1879; application filed May 19, 1879.

*To all whom it may concern:*

Be it known that we, FRANCIS G. BATES and WILLIAM C. HARTMANN, both of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Devices for Driving, Stopping, and Reversing Shafts, Wheels, or Pulleys, of which the following is a specification.

Our invention consists of mechanism, fully described hereinafter, for reversing shafts or for driving one shaft in one direction and an adjacent shaft in the contrary direction.

In the accompanying drawings, Figure 1, Sheet 1, is a longitudinal section of our improved reversing device applied to a single shaft; Fig. 2, the same with the parts in different positions; Fig. 3, a plan view of Fig. 2; Fig. 4, Sheet 2, a transverse section on the line 1 2, Fig. 3; Fig. 5, a longitudinal section of our reversing device applied to two shafts, and Fig. 6 a transverse section of Fig. 5 on the line 3 4.

In Figs. 1, 2, and 3, A represents part of a shaft, adapted to suitable bearings *a a*, and carrying a loose pulley, B, which can be clutched to or released from the shaft by any suitable device, that shown in the present instance being a friction-clutch similar to that for which reissued Letters Patent No. 8,518 were granted to C. E. Burwell and F. G. Bates on the 10th day of December, A. D. 1878, and consisting of a spring-ring, *b*, hung to a carrier, *d*, on the shaft A, and adapted to the hub *e* of the pulley B, the said ring being contracted by the action of a wedge-shaped block and lever, *f*, in obedience to the movement of a sliding sleeve, *g*.

To the shaft A, adjacent to the pulley B, is secured a pulley, D, and between the latter and a collar, *i*, on the shaft A is arranged a loose ring, E, to an arm on which is pivoted one end of a forked lever, F, the opposite end of the latter being connected to a rod, G, which also carries the arm J, for operating the sliding sleeve *g*.

To suitable spindles *m*, carried by the lever F, are adapted two friction-wheels, *n n*, which can turn freely on the spindles, the faces of these wheels being tapered and the periphery of the pulley D and inner face of the rim of

the pulley B being beveled to accord with the said friction-wheels.

The operation of the device is as follows: Power is applied to the pulley B by means of a belt from a pulley of any adjacent shaft. If the shaft A has to be turned in the same direction as the pulley, the parts are adjusted to the position shown in Fig. 1, the pulley being clutched to the shaft and the friction-wheels *n n* being free from contact with the pulley. If the shaft is to be turned in the contrary direction, the parts are adjusted to the position shown in Fig. 2, so that the pulley B shall be released from the shaft and the friction-wheels *n* forced into contact with the rim of the pulley B and the periphery of the pulley D. The latter and the shaft A will consequently be rotated, through the medium of the friction-wheels, in a direction the reverse of that in which the pulley B turns.

If the movement of the shaft A has to be arrested, the friction-wheels should be adjusted to a position midway, or thereabout, between the two extreme positions referred to above, in which case the pulley B will not be clutched to the shaft, and the friction-wheels will be free from contact with the pulleys B and D.

The spindles *m* are adapted to radial slots in the lever F, so that the friction-wheels will always accommodate themselves to the pulleys B and D.

In Figs. 5 and 6 we have shown our reversing device applied to two shafts, one of which is to be driven in one direction and the other in the opposite direction, a single friction-wheel, *n*, only being used in this case, and the devices for operating the said wheel being modified to some extent.

The shafts A A' are arranged in line longitudinally with each other, and are adapted to suitable bearings, a projection on the end of the shaft A' being adapted to a recess in the end of the shaft A, as shown by dotted lines, so as to insure lateral steadiness and the coincidence of the two shafts at this point. To the shaft A' is secured the pulley D, and to the shaft A is secured the pulley B, to which power is applied.

The friction-surfaces to which the wheel *n* is adapted are formed on the inner faces of

the pulleys B and D, and said wheel  $n$  is carried by a stud,  $s$ , projecting from a lever,  $F$ , hung to a ring,  $E$ , on the shaft, as before, the lever being operated by a cam on the rod  $G$ , so as to elevate or depress the wheel  $n$ , in a manner which will be readily understood. The wheel  $n$  may be adjusted on the stud  $s$ , so as to compensate for wear, by turning a set-screw,  $t$ , which passes through a threaded opening in the wheel and bears upon the end of the stud.

Power being applied to the pulley B, the shaft A will turn constantly in the same direction as the pulley, and the shaft A' will be turned in the contrary direction, or will remain at rest, according to the position of the wheel  $n$ .

If a continuous motion of the shaft A is not desired, the pulley B, instead of being connected directly thereto, may be connected to or released from the same by means of a clutch—for instance, that shown in Figs. 1, 2, and 3.

Where the transmission of motion from the pulley B to the pulley D must be positive, the friction wheel or wheels  $n$  may be replaced by bevel-pinions, in which case bevel-wheels adapted to the said pinions must be secured to or form a part of the pulleys B and D, and in some cases a cog-wheel may replace the pulley B—for instance, when the device is applied to the propeller-shaft of a vessel, to which the power of the engine has to be transmitted positively through cog-gearing.

We claim as our invention—

1. A driving pulley or wheel, B, on a shaft, A, and a pulley or wheel, D, on the same shaft, or on a shaft in line therewith, in combination

with an intermediate wheel or wheels,  $n$ , and with mechanism by which the said intermediate wheel or wheels may be moved into gear with both driving-wheel and wheel D when the latter has to revolve in a direction the reverse of the said driving-wheel, or can be moved out of gear with both wheels when the driven wheel has to be stopped, all substantially as set forth.

2. The combination of the shaft A, the fixed wheel or pulley D, the loose wheel or pulley B, devices for clutching said pulley B to the shaft and releasing it therefrom, and one or more wheels,  $n$ , interposed between the wheels or pulleys B and D, all substantially as specified.

3. The combination of the shaft A, the pulleys B and D, clutching mechanism for the said pulley B, the lever F, carrying one or more wheels,  $n$ , and a rod, G, for simultaneously operating the said lever and the clutching mechanism, as set forth.

4. The combination of the wheels or pulleys B D, the lever F, and one or more wheels,  $n$ , carried by said lever, but capable of moving radially on the same, so as to be self-accommodating to the wheels or pulleys, as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FRANCIS G. BATES.

WILLIAM C. HARTMANN.

Witnesses:

WILLIAM J. COOPER,

HARRY SMITH.