

No. 765,628.

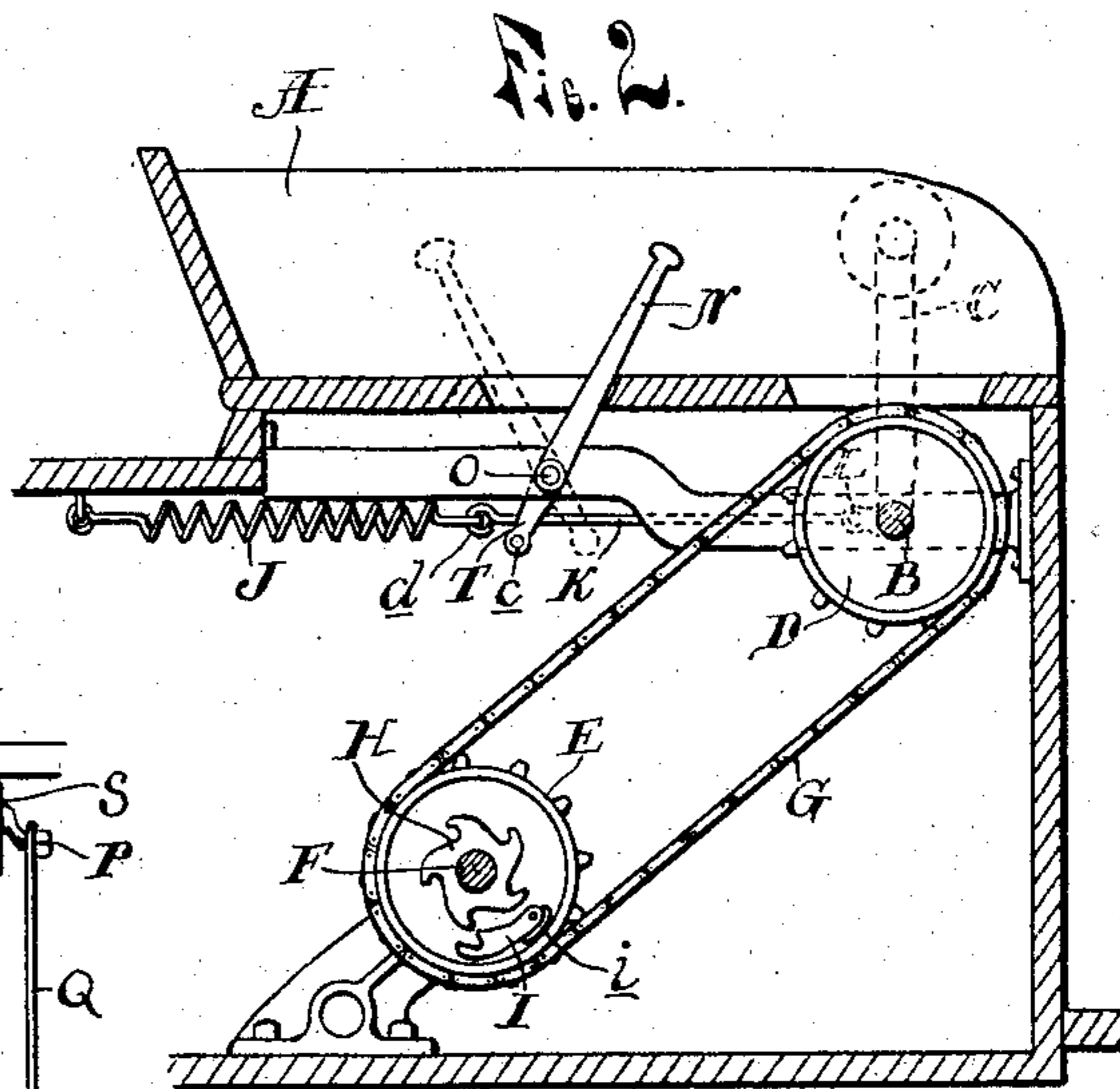
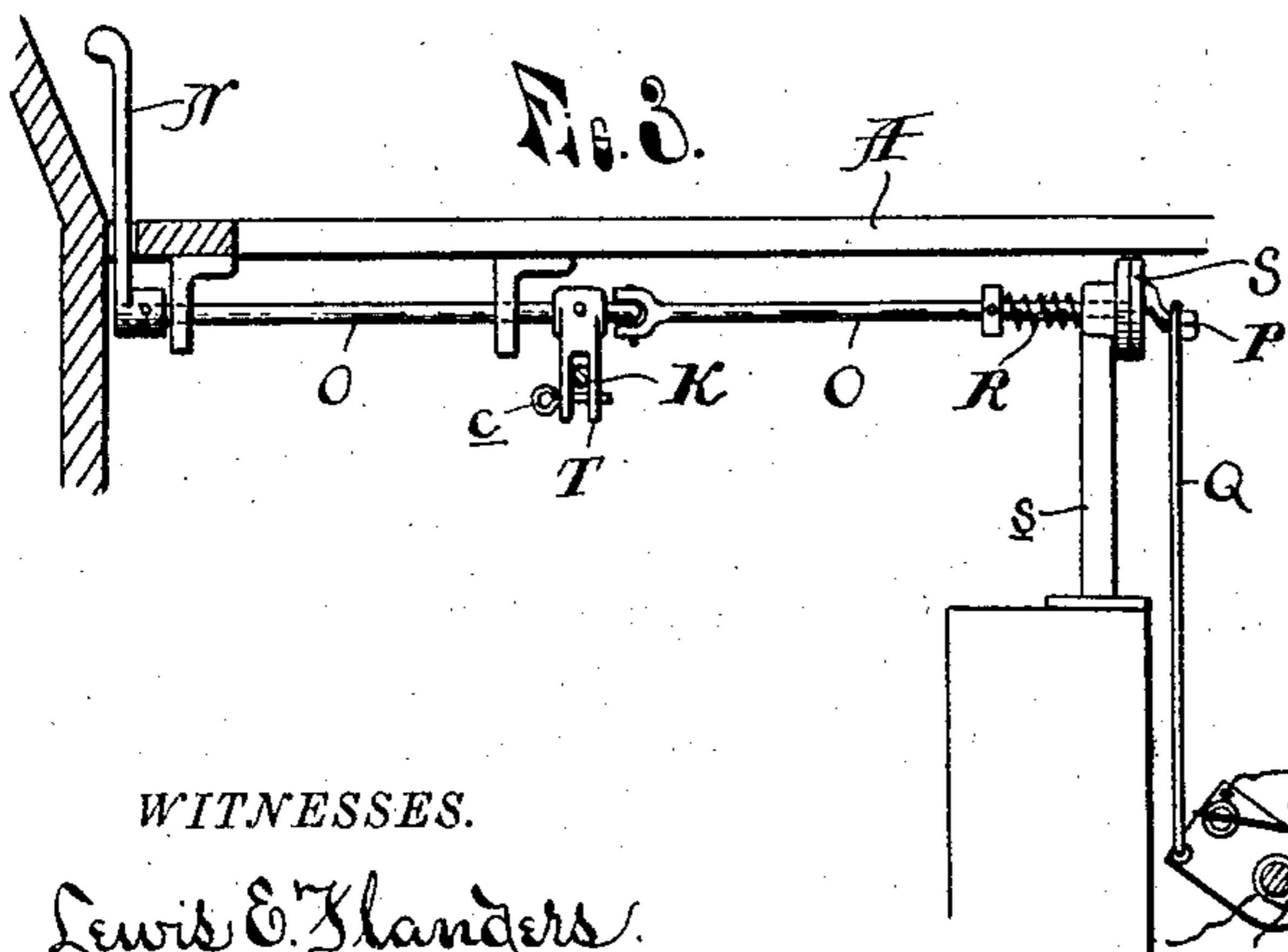
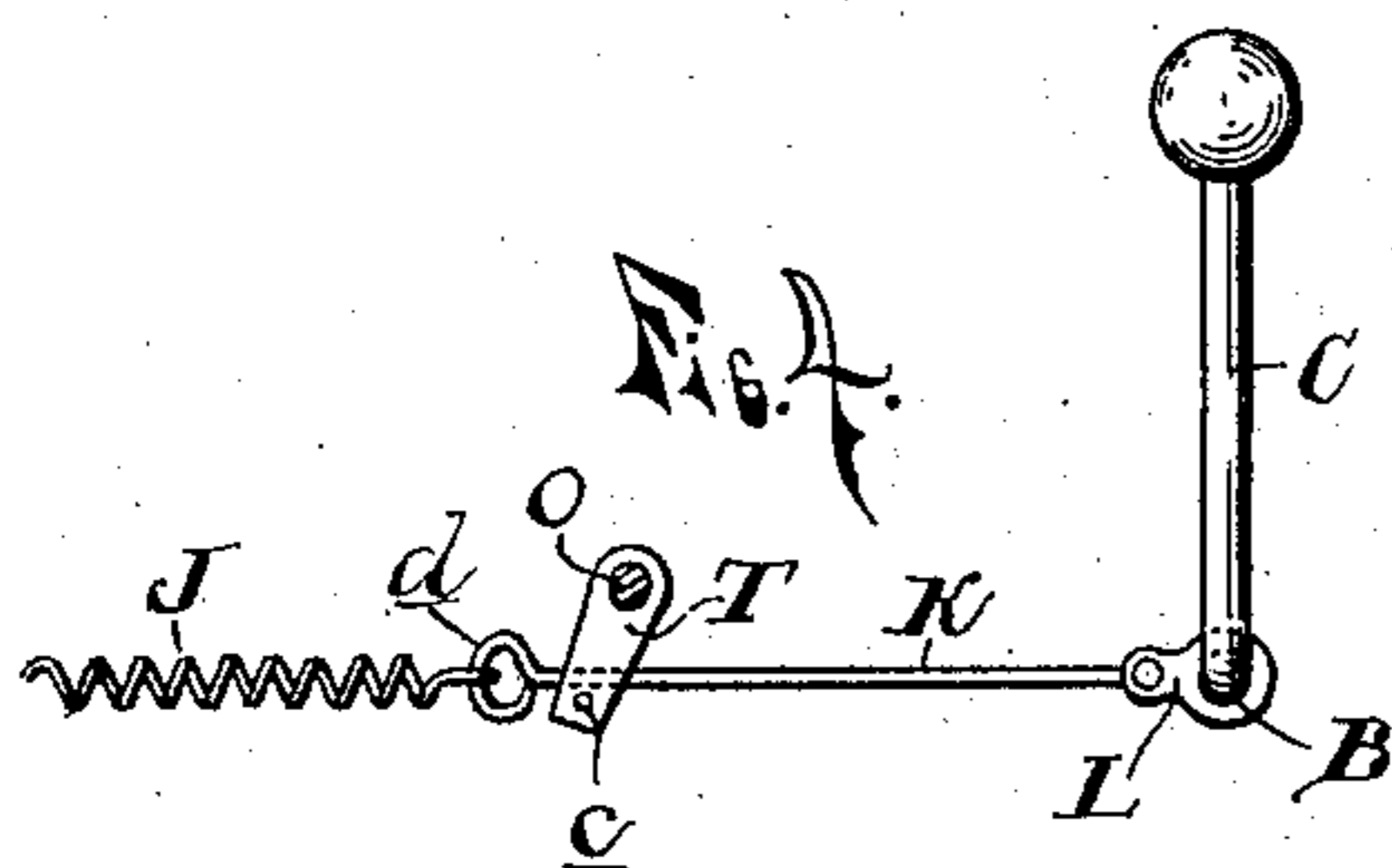
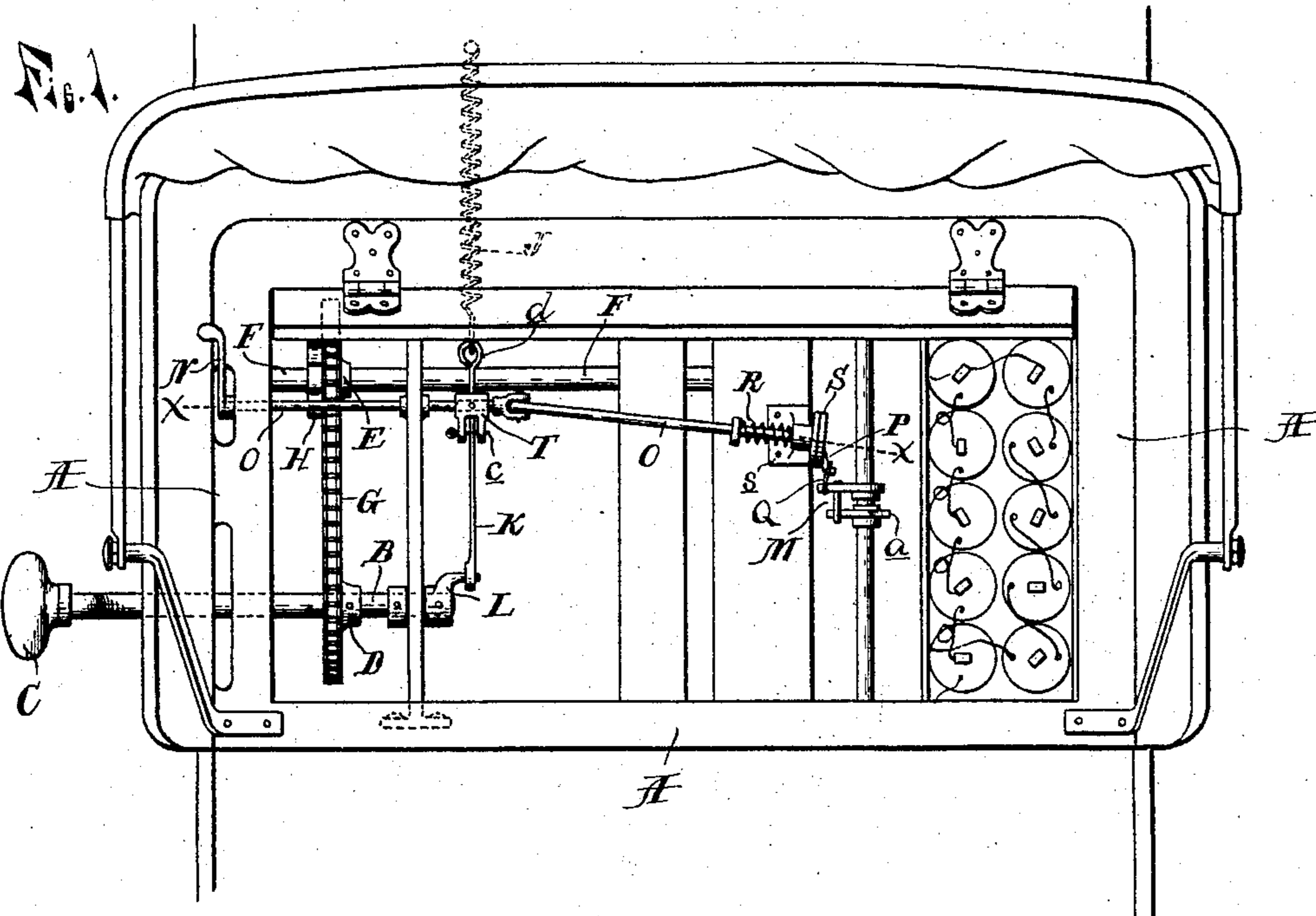
PATENTED JULY 19, 1904.

J. D. MAXWELL.

SAFETY MECHANISM FOR STARTING EXPLOSIVE ENGINES.

APPLICATION FILED JAN. 15, 1903.

NO MODEL.



WITNESSES.

Lewis E. Blanders.  
Thomas A. Longstaff.

INVENTOR.

Jonathan D. Maxwell.  
By *[Signature]*  
Attorneys.

# UNITED STATES PATENT OFFICE.

JONATHAN D. MAXWELL, OF DETROIT, MICHIGAN.

## SAFETY MECHANISM FOR STARTING EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 765,628, dated July 19, 1904.

Application filed January 15, 1903. Serial No. 139,108. (No model.)

*To all whom it may concern:*

Be it known that I, JONATHAN D. MAXWELL, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Safety Mechanism for Starting Explosive-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to starting mechanism for vehicles propelled by oil or gasoline motors in which a crank or its equivalent is provided for manually imparting an initial motion to the main shaft of the motor for starting the same; and the object of the invention is to protect the starting mechanism, as well as the operator, against possible injury liable to arise from the back motion of the main shaft. This is apt to result accidentally from a premature explosion during the starting if the operator forgets to set his spark-controlling lever in the proper position for obtaining a late spark. The operator having hold of the starting-handle thus often receives a violent blow from the handle flying back unexpectedly. The ordinary ratchet-and-gear starting mechanism also does not prevent the handle from flying back in case the motion of the main shaft is reversed, and this is also a source of injury to be guarded against.

To this end my invention consists in an improved starting mechanism of the ordinary ratchet-and-gear type in which provision is made to safeguard against injury from the above causes, all as more fully hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 is a plan view of my improved starting mechanism, showing it as arranged below the seat of the vehicle. Fig. 2 is a sectional side elevation thereof; Fig. 3, a vertical section substantially in the plane  $x x$ , Fig. 1. Fig. 4 is a sectional side elevation similar to Fig. 2, showing certain parts thereof in separate view.

A represents the seat of an automobile, in the body of which the starting mechanism is mainly disposed, as in ordinary practice. This starting mechanism is of the usual chain-and-

ratchet type, comprising a counter-shaft B, journaled in suitable bearings, a crank-handle C at the end of the counter-shaft adjacent to one end of the seat, sprocket-wheels D and E upon the counter-shaft B and the main shaft F of the motor, respectively, the sprocket-chain G connecting the sprocket-wheels and the ratchet H, which latter is fast upon the main shaft F and operates in connection with a pawl I, carried by the sprocket-wheel E to connect said sprocket-wheel with the main shaft when the handle C is turned to the right, as in starting the motor. The starting-handle is held when not in use in a normally fixed position, as shown in Figs. 1 and 2, by means of a tension-spring J, connected by a tension-rod K to a crank L, formed or provided at the inner end of the counter-shaft.

The new feature in the construction of this starting mechanism consists in making the two sprockets D and E of equal size and in making the pawl I a gravity-pawl so arranged and located in reference to the handle C that when the latter is in its normal position, as in Figs. 1 and 2, the pawl I is in its lowest position and held out of operative engagement with the ratchet, a suitable stop  $i$  being provided to hold the pawl in position to reengage.

It will be seen that if the handle C is turned to the right the pawl I will drop into engagement with the ratchet during the first half of a revolution and thereafter continue in engagement therewith as long as the handle C is turned, and thus the motion is imparted to the main shaft for starting the motor. As soon as the motor starts and the handle C is brought to its normal position the pawl, being in its lowest position, (on account of the sprocket-wheels D E being of equal size,) will immediately drop completely out of engagement with the ratchet-wheel and remain out of engagement therewith, not alone while the main shaft turns in the forward direction, but also if the reverse motion should be applied.

With my improved starting mechanism the handle C therefore remains in a stationary position on both the backward and forward motion of the vehicle, and thus all possible injury to the starting mechanism or to the operator from coming in contact with the fly-

ing handle is prevented, and in addition my construction does away with the constant click in driving arising from the use of the ordinary ratchet-and-pawl connection. To prevent the pawl from losing its engagement with the ratchet during the starting operation, the teeth of the ratchet are made suitably hook-shaped.

Another part of my improvement relates to means for preventing injury to the starting-gear or to the operator from the other cause above mentioned. To this end my invention consists in an operative connection between the starting mechanism and the mechanism for controlling the spark. In the drawings a spark-controlling mechanism of known construction is shown, comprising a circuit-closer M, of which *a* and *b* are respectively the fixed and revolving contacts, the latter being carried by the valve-shaft of the motor, the controlling hand-lever N, the shaft O, to which said controlling-lever is secured, the crank P at the inner end of the shaft O, and the connecting-rod Q between said crank and the insulated arm carrying the fixed contact, all so arranged that by the adjustment of the lever N forward or backward contact *a* is suitably retracted or advanced in relation to the revolving contact *b* to cause an early or late spark. As is customary, the lever N is held in its adjusted position by friction—as, for instance, by a coil-spring R, operating to create friction between two disks S, one of which is fixed to a suitable support *s* for the shaft-bearing, and the other is carried by the shaft.

In carrying out my invention with a spark-controlling device of this character I secure upon the shaft O thereof a forked crank-arm T, placed in such relation to the tension-rod K that the latter passes through the fork thereof, and if necessary the open end of the

same is closed by a cotter-key *c* or otherwise to prevent the parts from being accidentally disengaged. The tension-rod K is also provided with a head or stop *d* of sufficient size to prevent its passage through the fork and in such proximity thereto that whenever the starting-lever C is turned from its normal position the displacement of the tension-rod K caused thereby will engage the head or stop *d* thereon with the crank-arm T and move the fixed contact of the circuit-closer into proper position for giving a late spark, thus obviating all possible injury to the starting mechanism or to the operator from a premature explosion, which might start the motor in the wrong direction.

My construction is exceedingly simple and effective and requires little or no alteration in the spark-controlling device.

What I claim as my invention is—

The combination with the motor and its spark-controlling mechanism for manually advancing or retarding the spark, of the counter-shaft B, the handle C thereon, the tension-rod K and tension-spring J eccentrically connected to the counter-shaft, the shaft O, the disks S, the crank P on said shaft, the rod connected with said crank, a circuit-closer connected with said rod, the chain-and-ratchet drive connection connecting the counter-shaft with the main shaft of the motor, and the forked crank T upon the actuating-shaft of the spark-controlling mechanism cooperating with the tension-rod to automatically move the spark-controlling mechanism into prescribed position for starting the motor.

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

JONATHAN D. MAXWELL.

Witnesses:

OTTO F. BARTHEL,  
LEWIS E. FLANDERS.