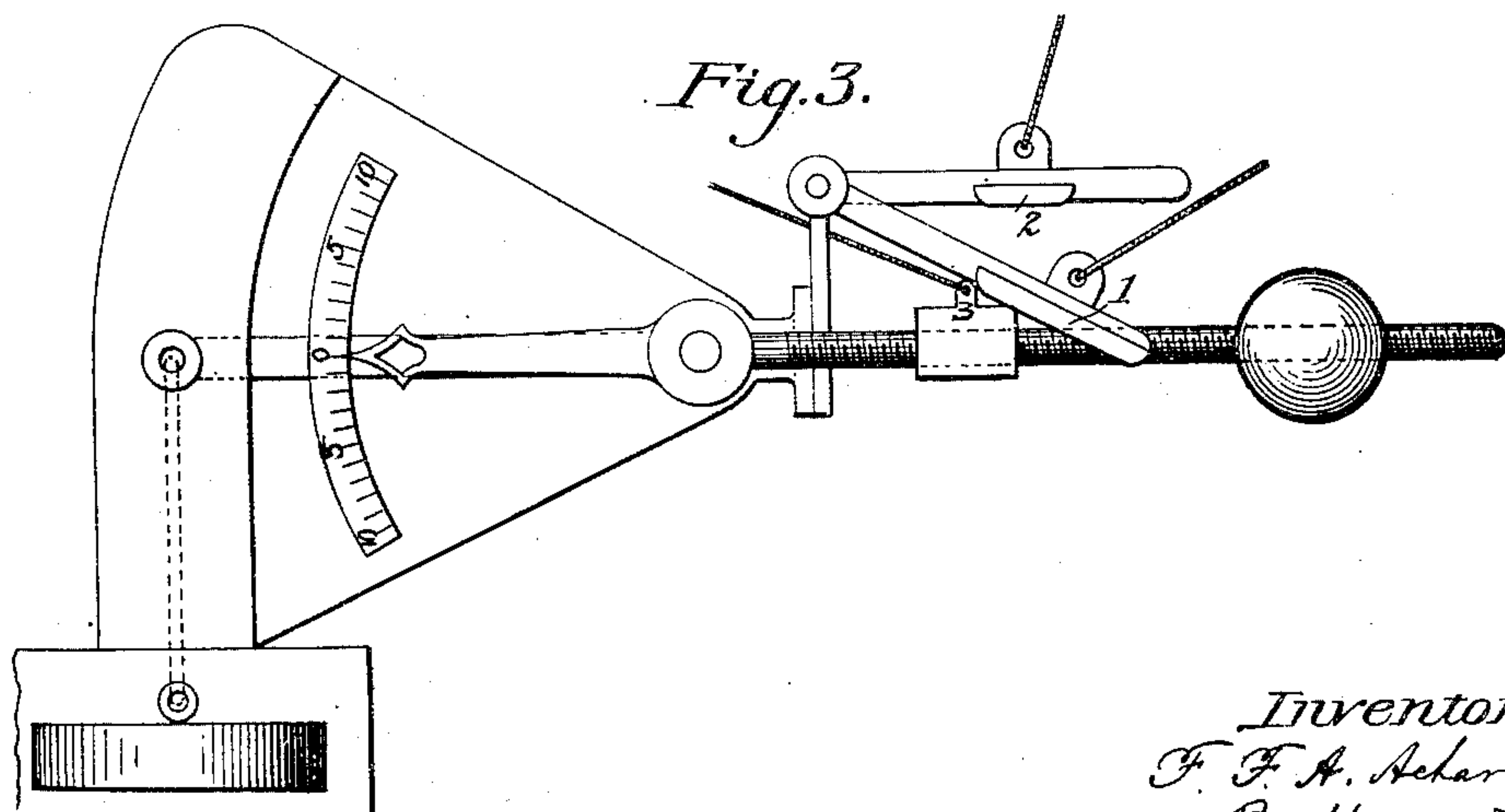
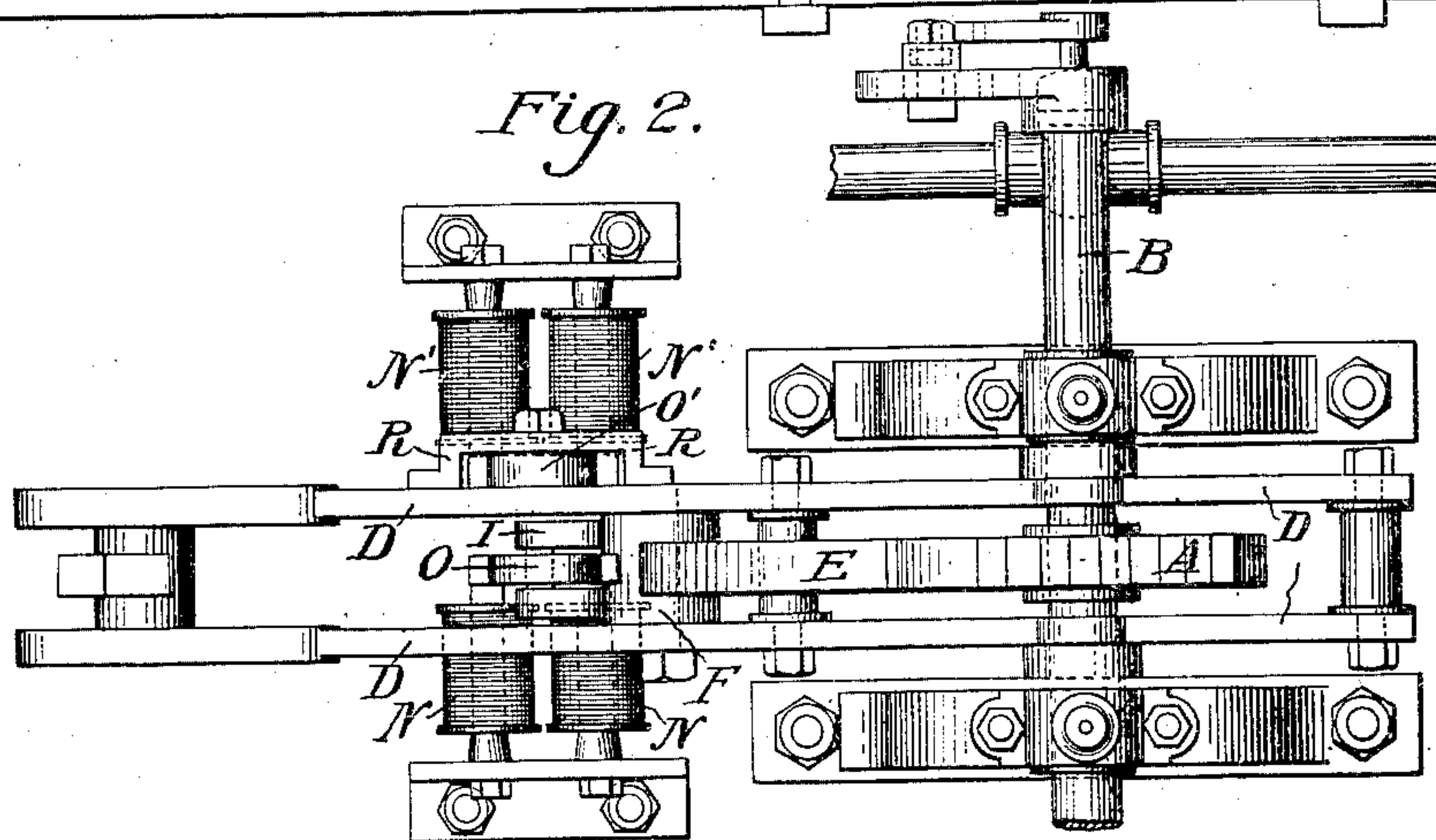
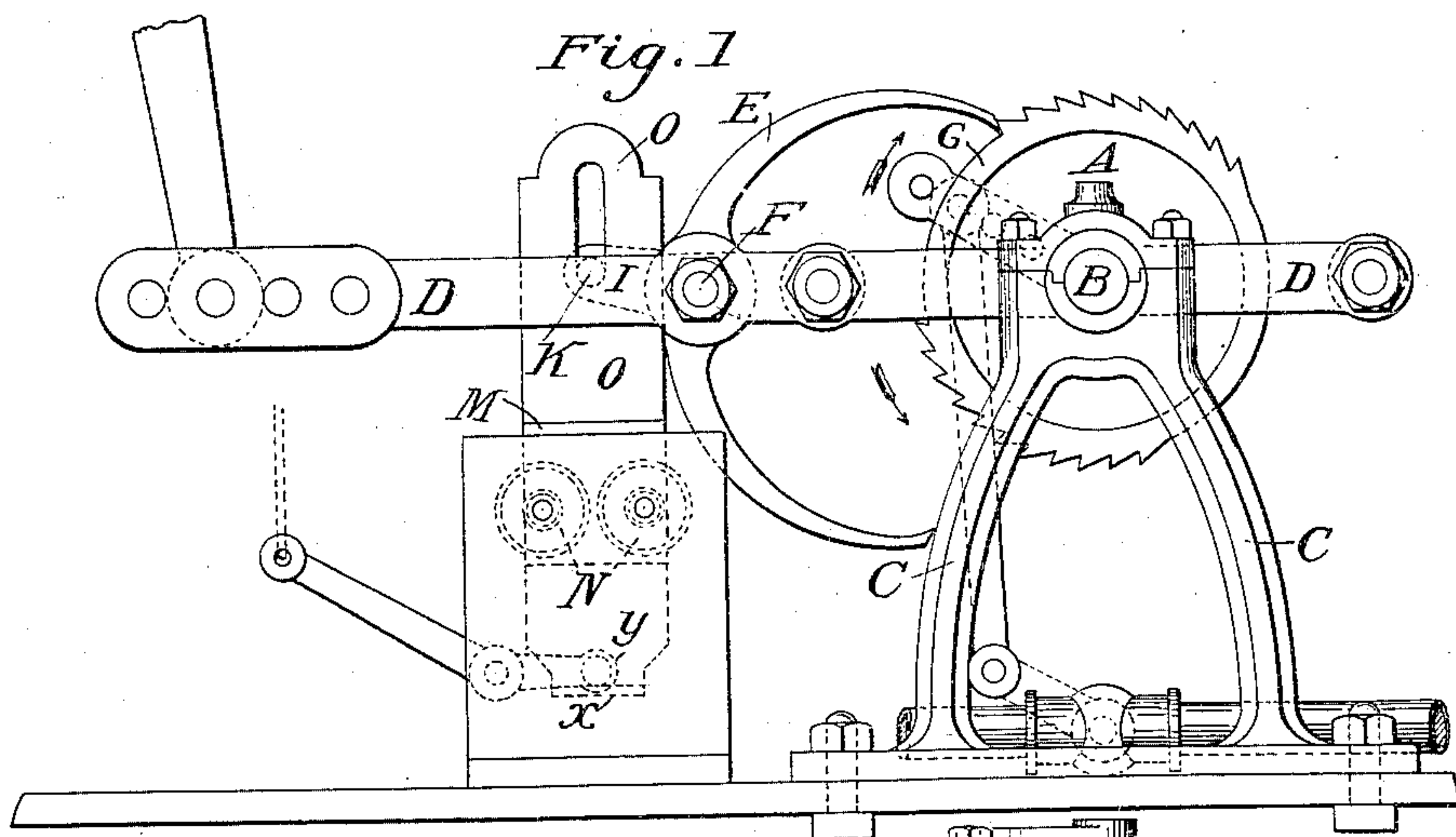


No. 49,842.

PATENTED SEPT. 5, 1865.

F. F. A. ACHARD.  
ELECTROMAGNETIC REGULATOR.



Witnesses:  
Wm. Cremon  
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By *[Signature]*



# UNITED STATES PATENT OFFICE.

FRANCOIS FERDINAND AUGUSTE ACHARD, OF PARIS, FRANCE.

## IMPROVEMENT IN ELECTRO-MAGNETIC REGULATORS.

Specification forming part of Letters Patent No. 49,842, dated September 5, 1865.

*To all whom it may concern:*

Be it known that I, FRANCOIS FERDINAND AUGUSTE ACHARD, of Paris, in the Empire of France, have invented a new and Improved Electro-Magnetic Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a side elevation of this invention, showing its application to a boiler-feed. Fig. 2 is a plan or top view of the same. Fig. 3 is a detached side elevation of the particular mechanism necessary for a boiler-feed.

Similar letters of reference indicate like parts.

This invention relates to an electro-magnetic apparatus which is applicable for the purpose of operating boiler-feeds or of regulating the pressure of steam or gases in closed vessels, and which also may be used for the purpose of operating car-brakes and for various other purposes.

The apparatus which I use for these purposes consists of a segmental ratchet-wheel, A, keyed on a shaft, B, which has its bearings in standards C. Said shaft also forms the fulcrum of a working-beam, D, which is composed of two parts that straddle the ratchet-wheel A, and which are connected by suitable cross-pieces applied at their ends and in their middle. Said working-beam oscillates loosely on the shaft B, and it is provided with a pin, F, that forms the fulcrum for the double-armed disk E. This disk turns loosely on its fulcrum-pin, and its points act on the teeth of the segmental ratchet-wheel A on opposite sides of the shaft B. The teeth comprising the two sections of the ratchet-wheel point in opposite directions, and each set occupies about one-quarter (more or less) of the entire circumference of the wheel.

From the rear end of the click E extends a forked tail-piece, I, the two parts of which are connected by a cross-piece or pin, K, and this pin plays in a slotted plate, O, that is fitted between the two jaws of the tail-piece I. Said slotted plate is made of brass or other suitable material, and connected to its lower end is

a plate, M, of soft iron, fitted in so as to be flush with the surface of the brass plate or armature O. Opposite this armature is placed a horizontal electro-magnet, N, the poles of which abut against the surface of the armature in such a manner that the latter on sliding up and down is always in metallic contact with said poles.

The operation is as follows: If the electric circuit through the electro-magnet is open and a continuous oscillating motion is imparted to the working-beam D by a steam-engine or other motive power, the weight of the armature O being suspended from the tail-piece I, keeps the lower arm of the disk E in gear with the lower section of teeth on the ratchet-wheel, causing the same to rotate in the direction of the black arrow marked near it in Fig. 1 of the drawings until the arm of the click comes in contact with the blank space intervening between the two sections of teeth, thus imparting to the shaft B one-quarter of a revolution (more or less) in the direction of the black arrow. If the circuit through the electro-magnet N is closed the armature O, in sliding against the poles of said electro-magnet, brings the soft-iron plate M in contact with said poles, causing the same to adhere with considerable force, which prevents the armature from descending with the disk, and on the return-stroke of the working-beam the pin in the tail-piece I of said disk is brought in contact with the lower edge of the slot in the armature, thereby throwing the upper arm of the disk in gear with the appropriate section of teeth on the ratchet-wheel. By these means the ratchet-wheel is turned in the direction of the red arrow for a quarter-revolution (more or less) or until the disk passes from the teeth on the blank space between the two sections.

It is obvious the circuit can be opened or closed either by hand or automatically, according to the purpose for which the apparatus is to be used. If it is to be used, for instance, for regulating the supply of water to steam-boilers, the circuit is opened or closed by the rising and falling of the float in the boiler. The apparatus which may be used for that purpose is illustrated in Fig. 3 of the drawings. In this case one pole of the battery connects with the metal plate 3, which is attached to a



piece of wood or other non-conducting material mounted on the lever of the index, while the other pole connects with the helix of the electro-magnet, and through it with a metal plate, 1, secured to a lever, the fulcrum of which is in a standard rising from the frame or plate which forms the bearing for the center-pin of the index. In order to close the circuit it is necessary that the metal plate 1 shall be in contact with the metal plate 3, and this will always be the case when the index is at zero (representing the mean water-line) or above the same; but this contact will cease as soon as the index falls below zero. If the feed-cock of the force-pump or other apparatus used for supplying water to the boiler is connected by suitable mechanism to the shaft B of the ratchet-wheel A it follows that said cock will make a quarter of a revolution in one direction if the circuit is closed, and a quarter-revolution in the opposite direction when the circuit is open, and consequently water will be supplied to the boiler as soon as the index falls below zero, and the feed-cock will be closed when the index rises to or above zero.

If desired, an alarm-bell can be connected to the apparatus in the following manner: A cap, R, (see Fig. 2,) is fixed to the side of the working-beam D. This cap forms the bearing for a pin, S, which operates in a slotted plate or armature, O', that is similar to the armature O previously described. Opposite said armature is placed a second electro-magnet, N', the poles of which are constantly in contact with the surface of the same. In this case one pole of the battery connects with the metal plate 3, as before stated, and the other pole connects with the helix of the electro-magnet N', and through it with plate 2, which is secured to a lever that is shown up in Fig. 3, but which, in reality, is always turned down, so as to bring the plate 2 in metallic contact with the plate 3, provided the index does not deviate beyond a certain degree in either direc-

tion from the zero-point. In this position the circuit is closed and the armature O' is held up by the action of the electro-magnet N', and it retains this position until the water in the boiler rises or falls beyond certain limits. As soon as this takes place the metallic contact between the plates 2 and 3 is interrupted, the circuit is opened, and the armature O' drops down. In doing so a lip, x, projecting from the lower edge of the armature O', passes below a pin, y, projecting from a bell-crank lever, z, and as the armature rises again by the subsequent stroke of the working-beam said bell-crank lever is caused to strike an alarm-bell. It will be seen that in either case the cock is opened or the bell sounded while the circuit is open, and consequently an absolutely-certain result is obtained.

The same apparatus may also be applied to regulate the pressure of steam or other gases in closed vessels; but in that case the circuit is opened and closed by the changes in the position of the manometer-index.

If desired, my apparatus can also be applied for the purpose of operating car-brakes and for producing changes in other parts of machinery; and I do not wish to confine myself in the use of my apparatus to any peculiar kind of machine or mechanism, but reserve the right to apply it in any case where it may appear desirable or useful.

What I claim as new, and desire to secure by Letters Patent, is—

An electro-magnetic apparatus composed of a sectional ratchet-wheel, A, working-beam D, double ratchet E, electro-magnets N, and armature O, constructed and operating substantially as and for the purpose herein shown and described.

FRANCOIS FERDINAND AUGUSTE ACHARD.

Witnesses:

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