

No. 640,431.

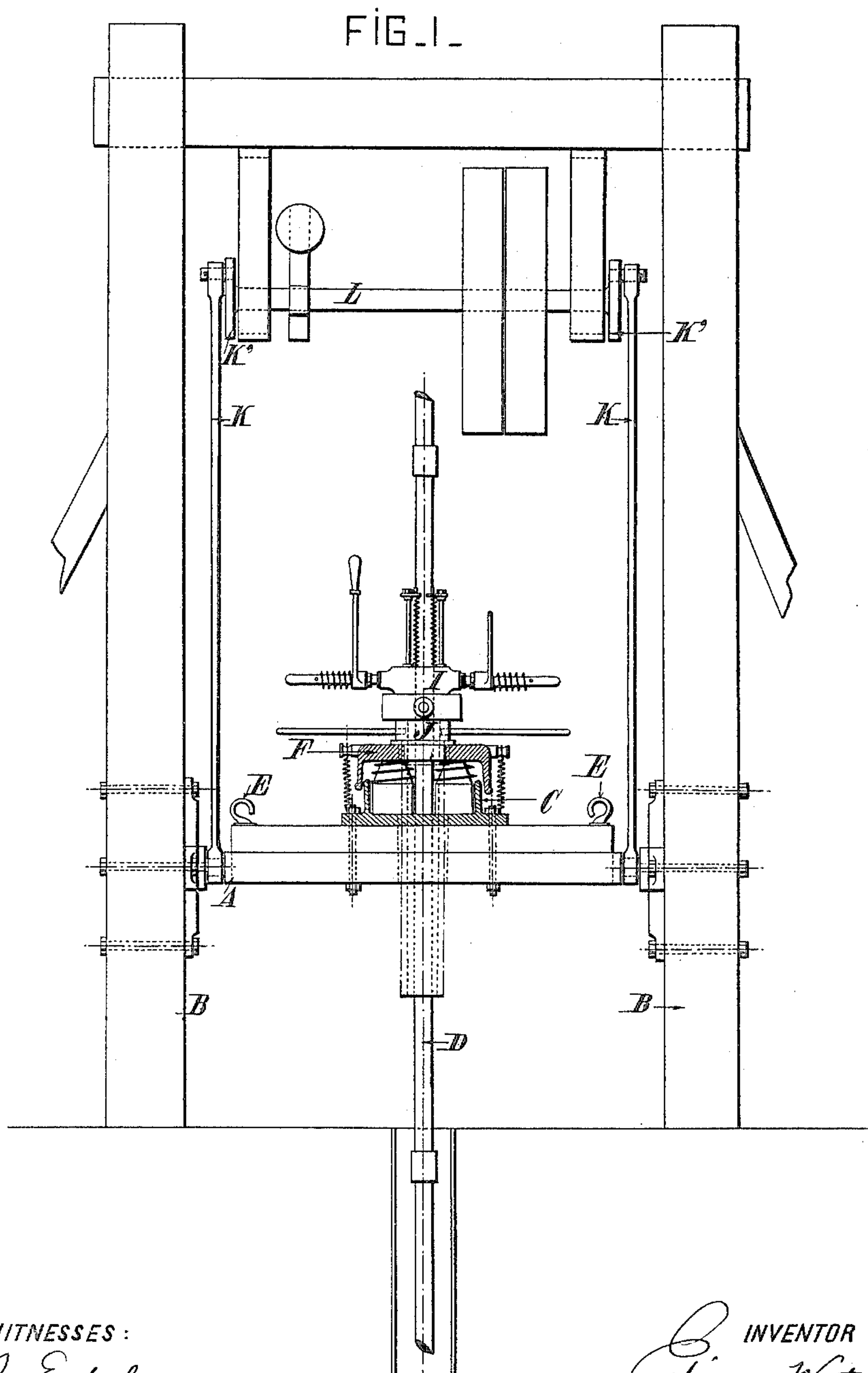
Patented Jan. 2, 1900.

E. WATEL.
HIGH SPEED DRILLING APPARATUS.

(Application filed May 26, 1898.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

W. R. Edelen

James Lewis

INVENTOR

Etienne Watel

BY

Alfred Mauro

his ATTORNEYS.

No. 640,431.

Patented Jan. 2, 1900.

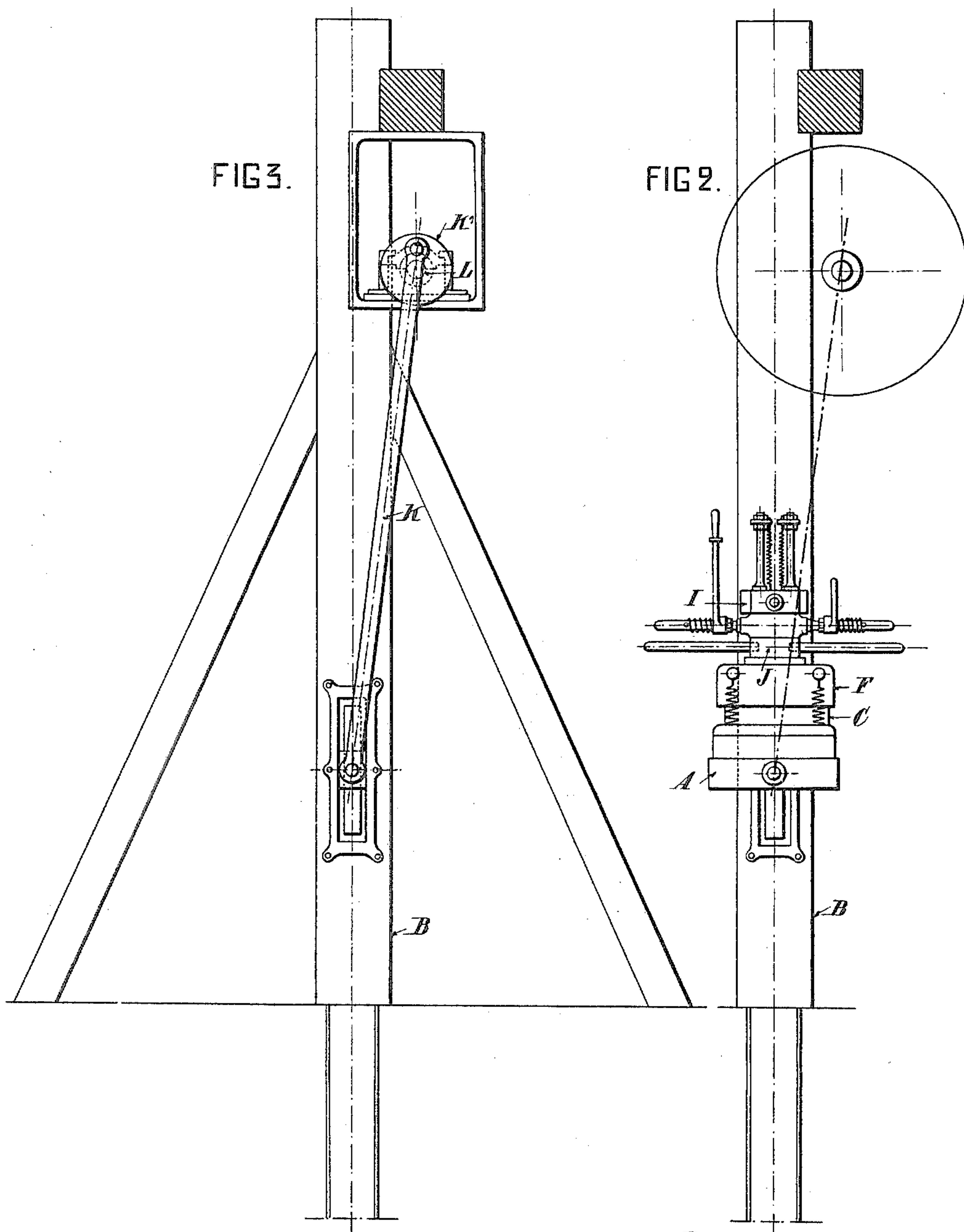
E. WATEL.

HIGH SPEED DRILLING APPARATUS.

(Application filed May 26, 1898.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES:

W. R. Edeelen.

Robert Lewis

INVENTOR

INVENTOR
Etienne Watel

BY

51
Holl & Mann
ATTORNEYS.

ATTORNEYS

No. 640,431.

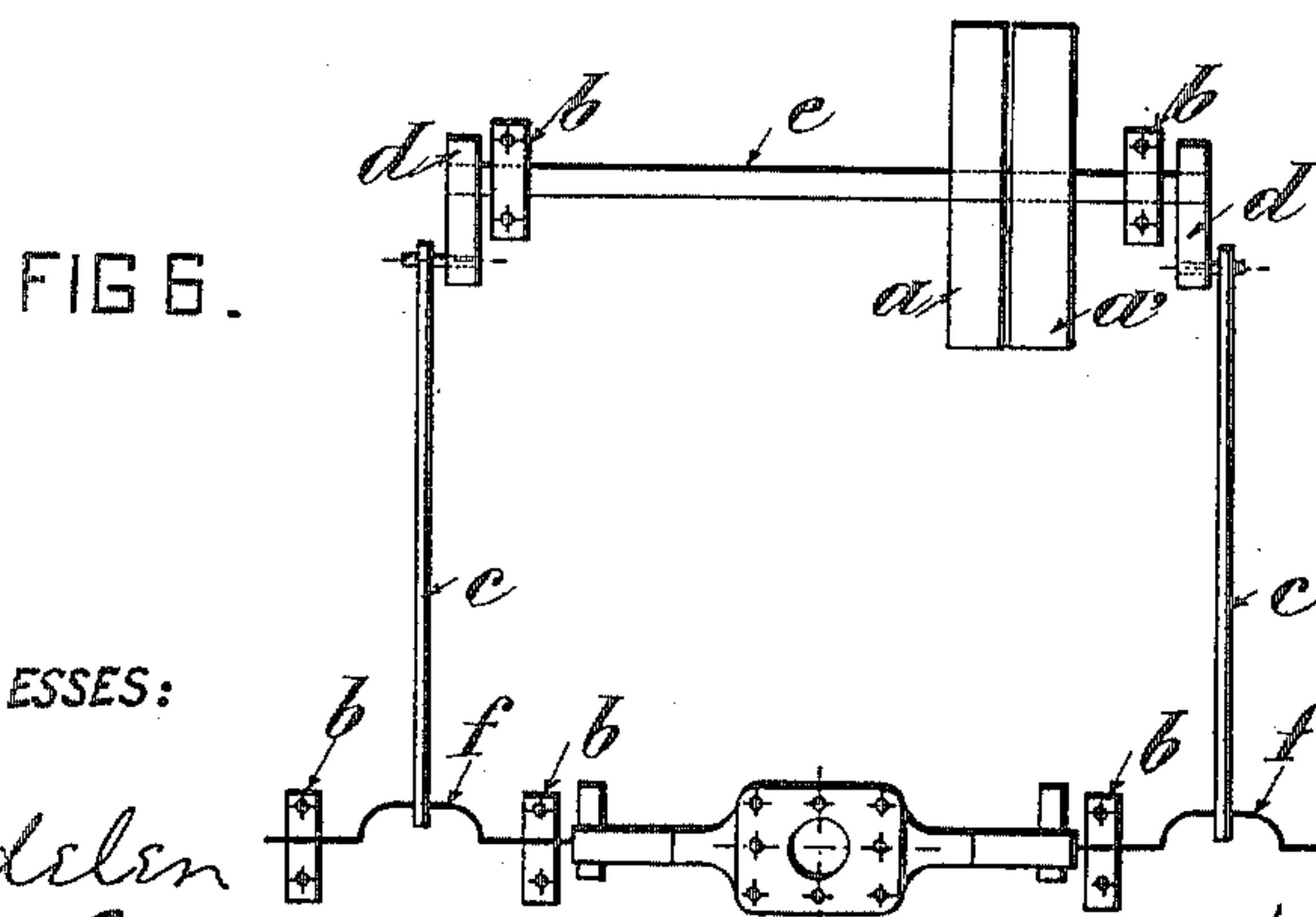
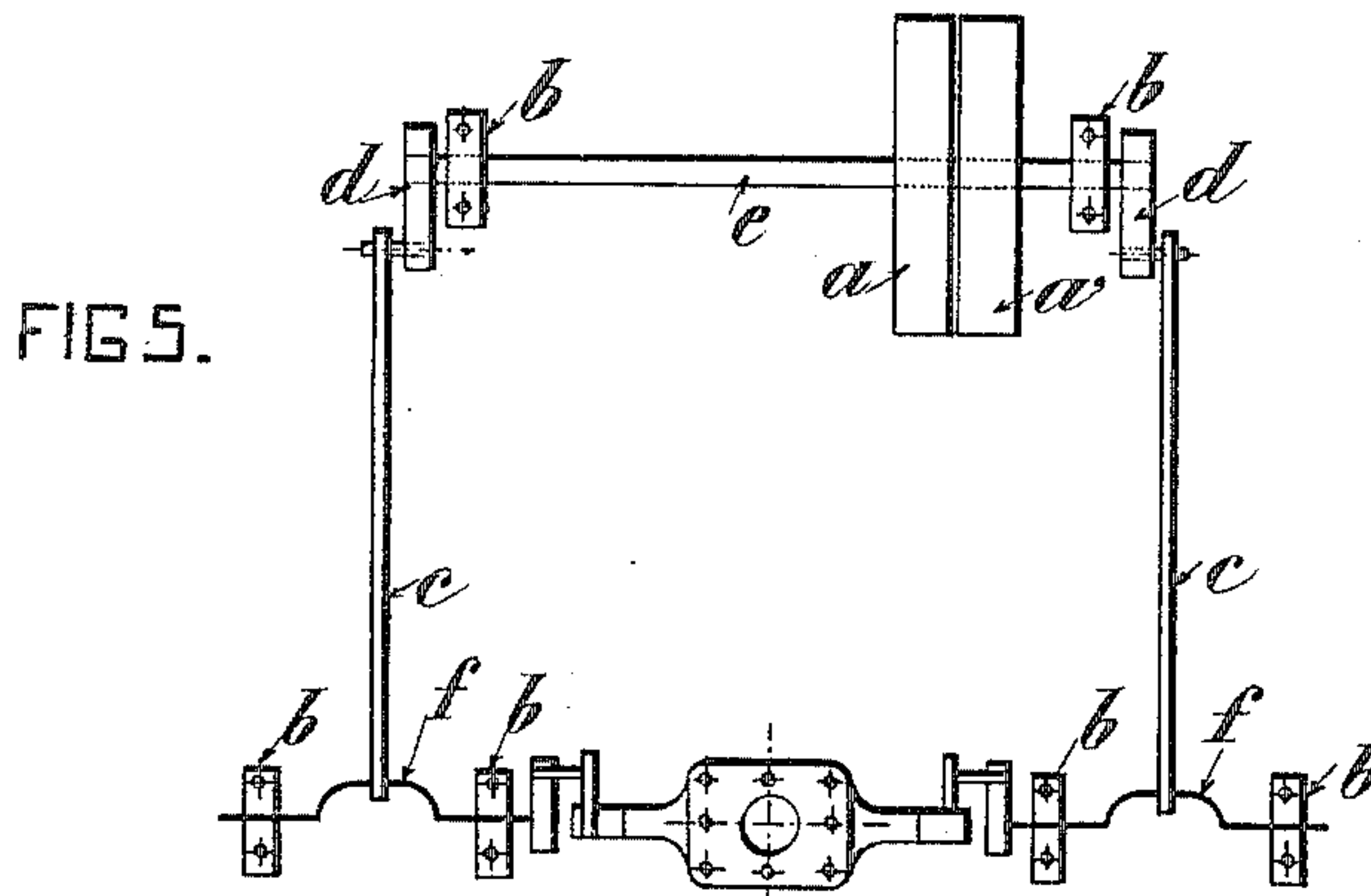
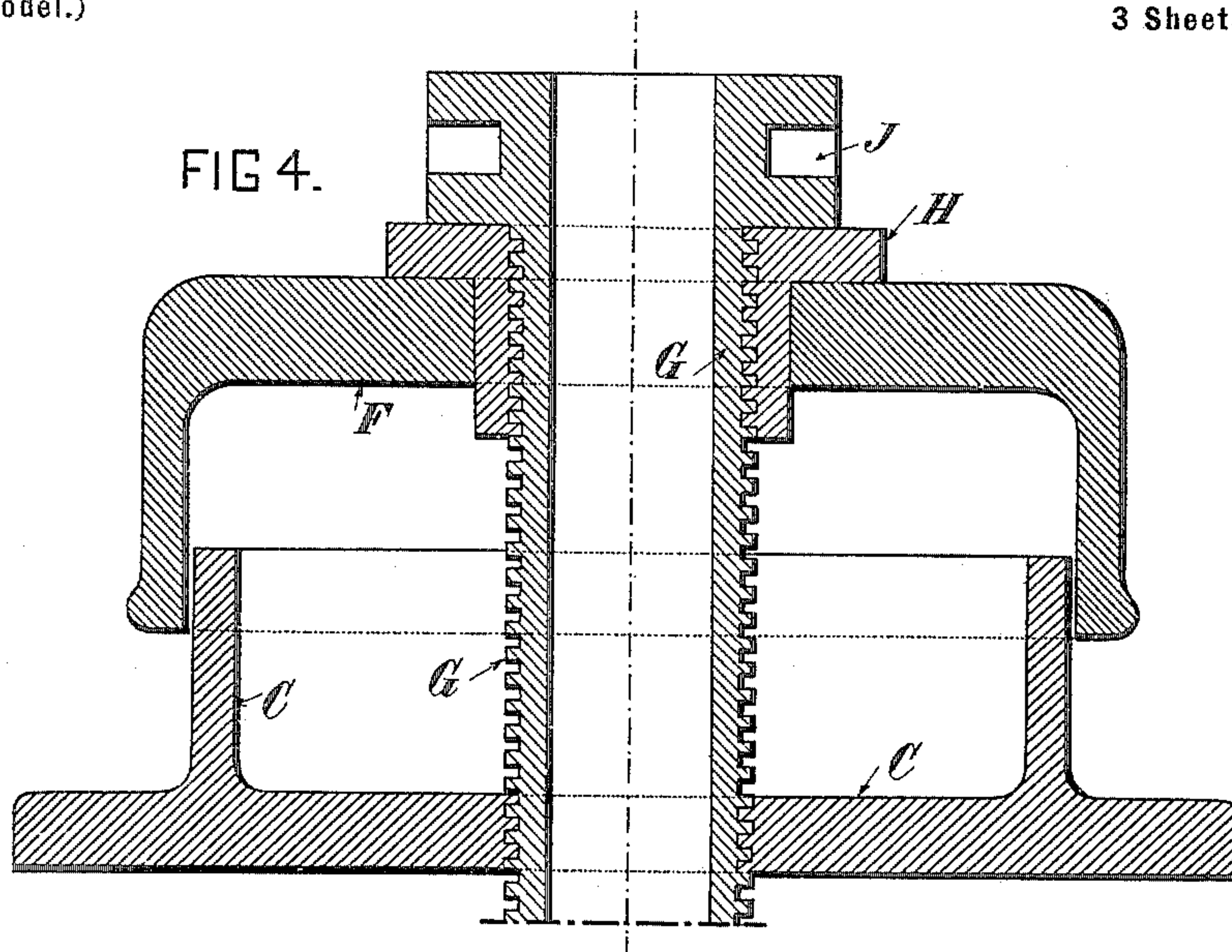
Patented Jan. 2, 1900.

E. WATEL.
HIGH SPEED DRILLING APPARATUS.

(Application filed May 26, 1898.)

(No Model.)

3 Sheets—Sheet 3.



WITNESSES:

W. R. Edelen
R. W. Lewis

INVENTOR

Chienne Watel
BY

John H. Maurer
ATTORNEYS

UNITED STATES PATENT OFFICE

ETIENNE WATEL, OF PARIS, FRANCE, ASSIGNOR OF TWO-THIRDS TO
PROSPER CLERC AND ALEXIS TRICARD, OF SAME PLACE.

HIGH-SPEED DRILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 640,431, dated January 2, 1900.

Application filed May 26, 1898. Serial No. 681,833. (No model.)

To all whom it may concern:

Be it known that I, ETIENNE WATEL, a citizen of the Republic of France, and a resident of Paris, France, have invented a new and useful High-Speed Drilling Apparatus, which is fully set forth in the following specification.

Experience shows that in drilling, whatever be the system employed, the useful effect of the drill or cutter depends much more on the number of strokes per minute than on the height of fall and that the advance increases rapidly with the increased speed of the tool even if the force of the blows be perceptibly reduced. All drilling-machines used in mines are generally constructed on the above principle, and the drilling apparatus according to this invention is also based on the same principle. I obtain this result in the following manner: The balance-beam, which in all mechanical devices is an obstacle to great speed, is here done away with, and the spindle of the drill is actuated by a special tool-support directly connected to the driving-shaft by connecting-rods and cranks or by eccentrics.

In order to make the description clearer, the new drilling apparatus according to this invention is illustrated by way of example in the accompanying drawings, in which—

Figure 1 is a front elevation of the whole apparatus. Figs. 2 and 3 are side elevations; Fig. 4, a detail view of the tool-holder, and Figs. 5 and 6 are plan views showing diagrammatically examples of transmission-gearing.

The tool-support is chiefly constituted by a horizontal frame A, arranged so that its center is in line with the axis of the hole to be drilled and guided at both ends of its greater axis in vertical guides B. On the frame A rests a plate supporting a spring-box C, acting as a buffer between the drill-spindle D and the tool-support. Hooks E, secured to the plate, enable it to be removed from the frame when desired, so as to uncover the orifice for the drilling-shaft, if required, say, for introducing tubes.

The drill-spindle D is supported on the upper cover F of the spring-box by means of a special device, enabling the position of the

drill relatively to the bottom of the hole to be instantly regulated during working in a very exact manner without necessitating an interruption of the working of the tool-holder. The plate and the spring-box are each provided to this end with a central hole corresponding to the axis of the bore-hole, a hollow screw G passing through said holes and engaging with a fixed vertical nut H, secured to the cover of the spring-box. The drill-spindle passes freely through the whole length of the hollow screw G and rests, by means of suitable devices I, on the upper flange J of said hollow screw. The tool-support is connected to the driving-shaft L by connecting-rods K and cranks K', Figs. 1 and 3. This method of driving is of course given only by way of example, and any other combination of connecting-rods and cranks or eccentrics may be used as long as it enables the use of a balance-beam and vertical guiding of the drill-spindle to be avoided, so as to permit of the machine being driven at a high speed. Two other suitable driving-gears are illustrated by way of example in Figs. 5 and 6.

a a' are loose and fast pulleys; *b b*, the fixed parts or bearings; *c c*, the connecting-rods, and *d d* the cranks transmitting the motion of the driving-shaft *e* to the connecting-rods *c*. *f f* are crank-shafts which in one case act on the spring-box through intermediate connecting-rods and in the other case through the intermediary of eccentrics directly raising the spindle or ends of the tool-support. These arrangements enable all the transmission-gear to be arranged below the working platform, so as to leave the matter quite unimpeded.

It will be observed that by means of the construction hereinbefore described I obtain an action of the drill-spindle in a right line both in the upward and downward movement thereof and at the same time provide a buffer device by means of which I am enabled to avoid injurious jars and strains to the mechanism not only on the upward but also on the downward stroke, the strain upon the buffer device being in a right line in each case. This is a matter of exceeding importance.

tance in high-speed drills which are given many hundred strokes per minute.

I claim—

- 5 1. In a high-speed drill the combination of a spring-box, a cover therefor, springs or buffers supporting the cover from the box, a drill-spindle supported by the cover, and means for reciprocating the box in a right line, substantially as described.
- 10 2. In a high-speed drill the combination of a spring-box, a cover therefor, springs or buffers supporting the cover from the box, a

drill-spindle adjustably supported by the cover, means for reciprocating the box in a right line, and means for adjusting the drill- 15 spindle in the cover, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ETIENNE WATEL.

Witnesses:

EDWARD P. MACLEAN,
ANTOINE ROUSSANNER.