

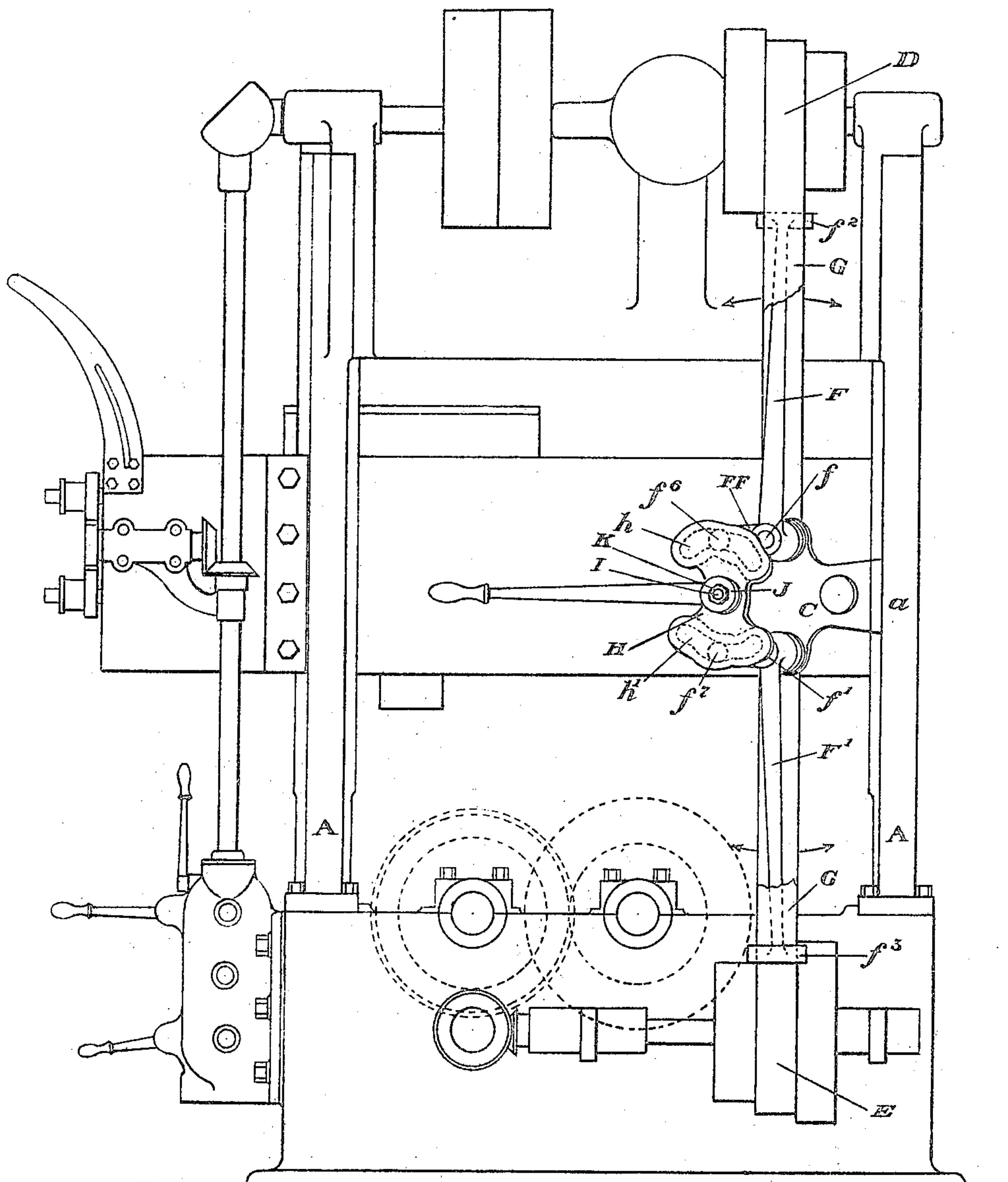
No. 821,181.

PATENTED MAY 22, 1906.

E. A. MULLER.
BELT SHIFTER.
APPLICATION FILED APR. 12, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

Chas. Hubert Jones
Joseph R. Gardner

INVENTOR.

Edward A. Muller

BY

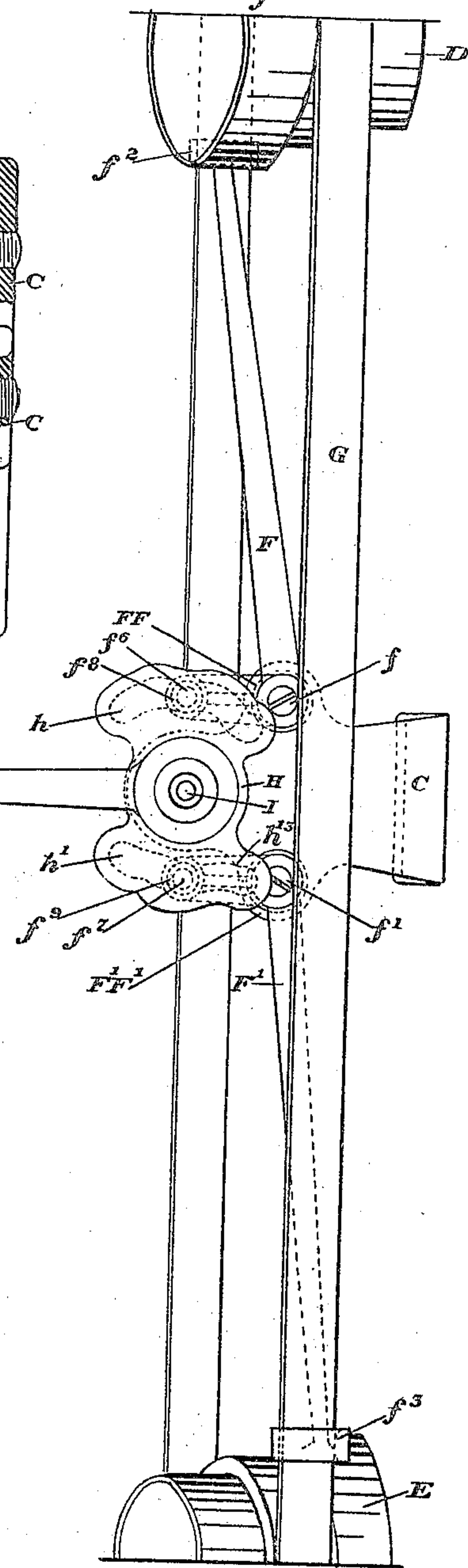
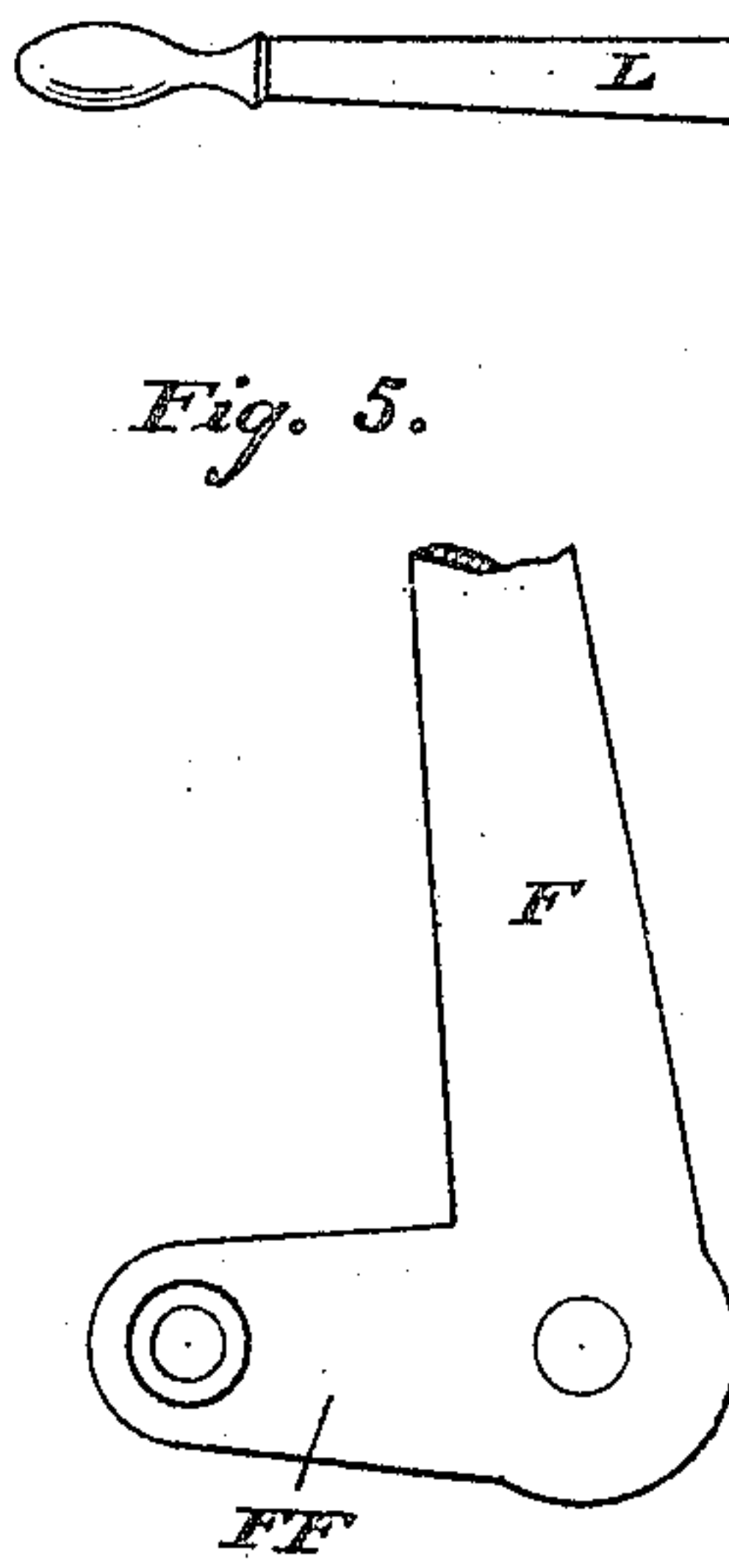
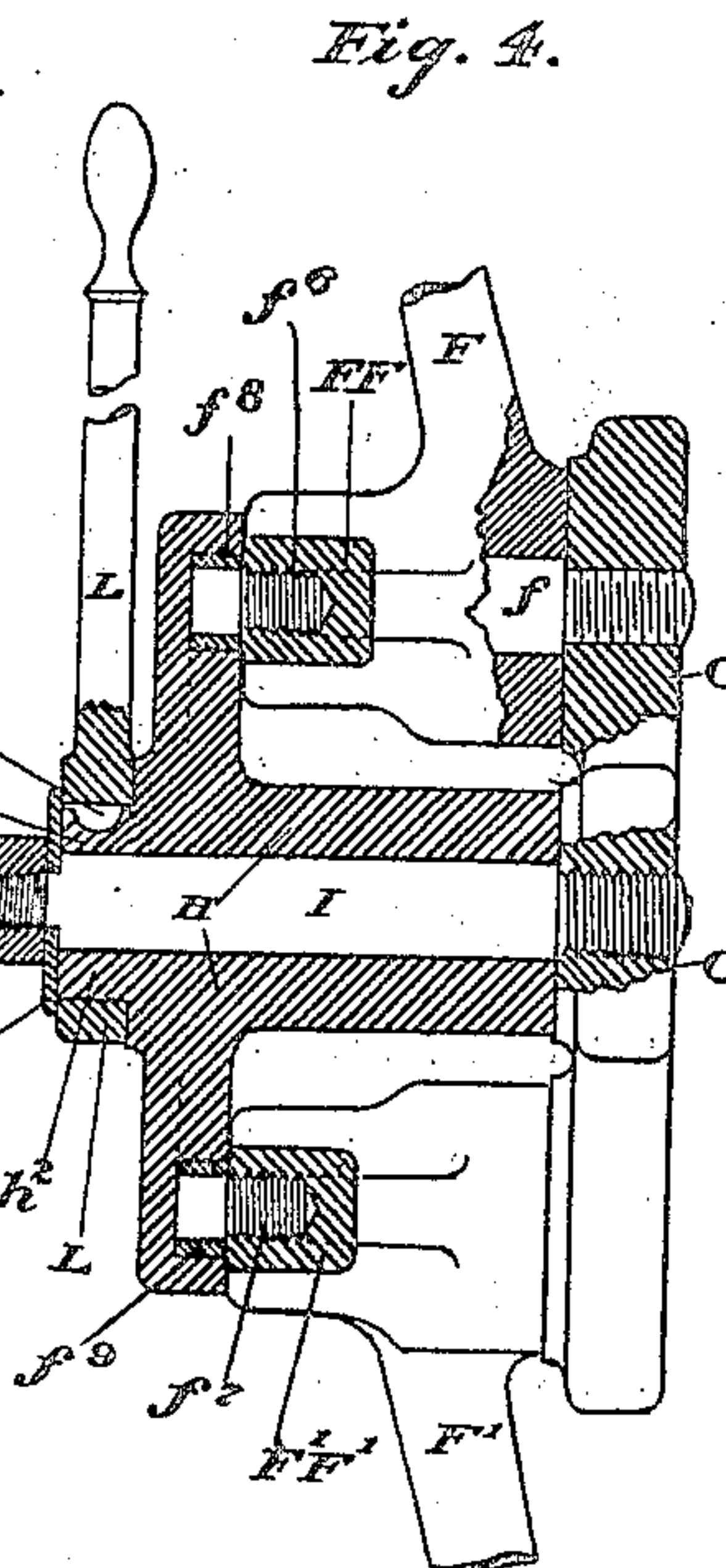
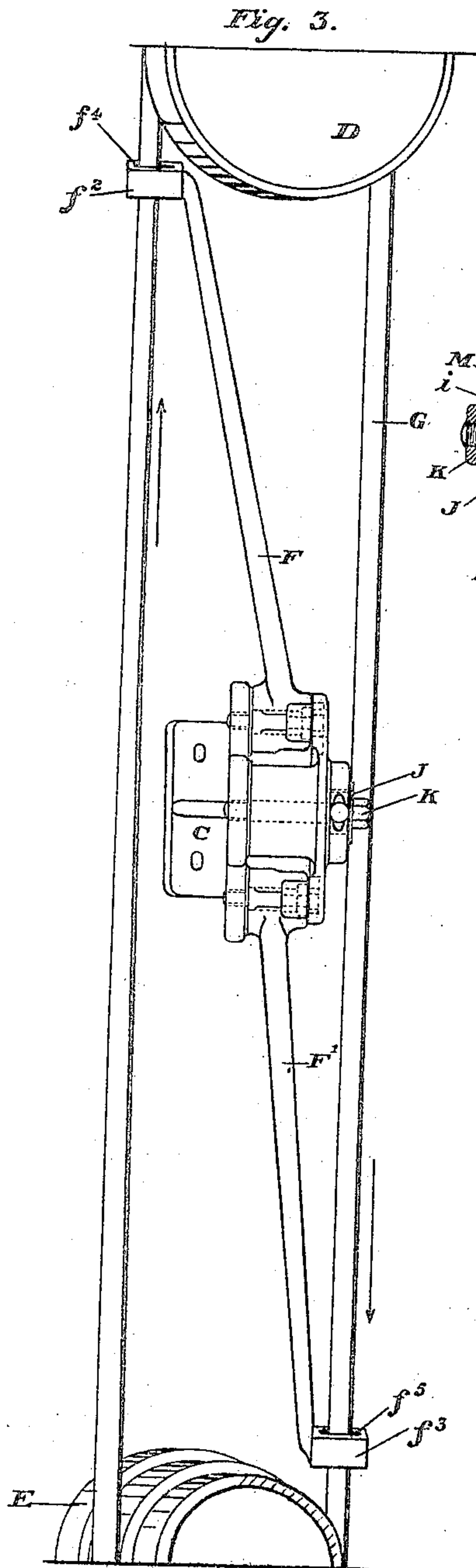
Walter A. Knight ATTORNEY.

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2 SHEETS—SHEET 2.
Fig. 2.



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UNITED STATES PATENT OFFICE.

EDWARD A. MULLER, OF MADISONVILLE, OHIO, ASSIGNOR TO THE KING MACHINE TOOL COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

BELT-SHIFTER.

No. 821,181.

Specification of Letters Patent.

Patented May 22, 1906.

Application filed April 12, 1905. Serial No. 255,111.

To all whom it may concern:

Be it known that I, EDWARD A. MULLER, a citizen of the United States, residing at Madisonville, in the county of Hamilton and State of Ohio, have invented new and useful Improvements in Belt-Shifters, of which the following is a specification.

My invention relates to improvements in belt-shifters, those for shifting belts on cone-pulleys particularly, where the counter-shaft carrying one of same is affixed to the frame of the machine.

In the particular embodiment of my invention selected for illustration, Figure 1 is a rear elevation of a boring-mill, showing my improvement in position with parts of boring-mill broken away. Fig. 2 is an enlargement of my improvement, same view as Fig. 1. Fig. 3 is a side elevation of my shifter and suitable cones. Fig. 4 is a view of the shifter mechanism, with parts broken away, making partial vertical axial sections in planes of each of the several studs. Fig. 5 is a detail of part of one of the bent shifter-levers and its cam-stud.

My invention relates to primary speed-changing mechanism.

If a higher rotation is required than that between maximum and minimum speeds of the cones, trains of gears of suitable ratios are interposed between the receiving-cone and the driven gear, constituting a secondary speed-changer.

The machine-housing is designated as A. Extending therefrom at any convenient point, as *a*, is a bracket C of any desired shape and size, in the drawings shown as extending from a point midway between the upper cone-pulley D and the lower cone-pulley E and in such direction as to bring the shifter-arms or levers on a line with the middle step of each of said cone-pulleys.

The belt-shifting mechanism consists of a bent lever F, attached to bracket C by a stud-bolt *f*, so as to oscillate freely in the direction shown by the arrows in Fig. 1. This bent lever or shifter-arm terminates short of the face of cone-pulley D in guide *f*², pierced by suitable opening *f*⁴, through which the belt G passes. A similar lever F', movably attached by stud-bolt *f*' to bracket C, terminates short of the face of cone-pulley E and has a guide *f*³, pierced by a suitable opening *f*⁵ for the passage of belt G. Lever F has an

angular projection F F, provided with a stud-bolt *f*⁶, adapted to travel in the track *h* of the cam H. This stud *f*⁶ is preferably provided with a stud-roll *f*⁸. All similar parts of lever F' and mechanism pertaining to the movement thereof are lettered like lever F, with the next higher index-numeral.

Cam H is pierced to allow a stud-bolt I to pass through. This bolt is threaded into bracket C at one end, and cam is held outwardly by washer J and nut K. Cam H has an axial extension *h*², over which handle L is placed and to which it is keyed by key M, or handle and cam may be rotatively attached in any other convenient way. The cam H has its tracks *h* and *h*' so formed that any movement of cam through the rotation of handle L produces corresponding movements of shifter-arm F and F' in opposite directions. If the handle is moved upward from the position shown in Fig. 2, stud *f*⁶ will be raised from its present position. The raising of the stud carries with it short arm F F of bent lever, causing shifter *f*² of long arm F to be moved toward the lowest step of cone-pulley D, carrying the belt off the middle step onto the lowest step. A slight further movement of the handle brings the stud *f*⁷ to a point in the cam-track *h*', where stud *f*⁷ is raised, carrying with it short arm F' F' of bent lever, and shifter *f*³ of long arm F' is moved toward the highest step of cone-pulley E. These two operations have been accomplished at so nearly the same time that the result is almost instantaneous. The cam-tracks are relatively so shaped and placed that whichever way the lever L is moved the belt is carried off the higher step of one cone-pulley onto a lower before being carried onto the corresponding higher step of the other. The shifter-arms are so shaped and placed that the guides *f*² *f*³ are adjacent to the side of their respective pulleys onto which the belt runs, as shown in Fig. 3, in order to easily and quickly control the movements of the belt.

The operation has already been indicated, and it is apparent that to shift belt from one extreme to the other requires only the time necessary to press the handle while machine is operating from highest to lowest position, or vice versa, or to accomplish any part of said motion.

It is obvious that the range of my primary speed-changing device can be narrowed to a

pair of two-step cone-pulleys or extended to cones of as many steps as are found practical.

The bracket to which actuating mechanism is attached has its face at such an inclination to the axis of the cones as to be in line with lines drawn touching highest points of the steps of the cones on their adjacent surfaces, so that in the several positions of the belt-guides the guides are always at the same distance from the cone-pulley face.

I claim as my invention and desire to secure by Letters Patent of the United States—

1. In combination with a pair of cone belt-pulleys, unitary mechanical means including operating-cams for shifting said belt to the different steps of said pulleys, at will.

2. The combination with a pair of cone belt-pulleys of a fixed bracket, two shifter-levers movably attached to said bracket, one arm of each of which extends to within controlling distance of one each of the cone-pulleys and cams for suitably oscillating said shifter-levers, substantially as set forth.

3. The combination with a pair of cone belt-pulleys of a fixed bracket, two shifter-levers movably attached thereto, one end of each of which extends to within controlling distance of one each of the cone-pulleys, a stud on the other end of each of said shifter-levers, a double-track cam operatively attached to said bracket having its tracks adapted to receive and actuate said studs

and their levers, and means for actuating said cam, substantially as set forth.

4. In a machine having a shaft with a cone-pulley thereon, a counter-shaft with corresponding pulleys, said shaft journaled to the frame of the machine, and unitary cam-actuated means for shifting the belt to any of the several steps of said cone-pulleys, at will.

5. In a machine having a main shaft with a cone-pulley thereon, and a counter-shaft with a corresponding cone-pulley, said shafts journaled in the frame of the machine; in combination with cams and cam-actuated levers adapted to shift the belt to any of the several steps of said cone-pulley by a suitable movement of one lever, substantially as set forth.

6. The combination with a machine having an actuating-shaft, a counter-shaft and a cone-pulley affixed thereto said shafts being journaled in the frame of the machine; of levers and cams adapted to shift the belt to each of the several steps of said cone-pulleys, and unitary means for actuating the same, substantially as set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EDWARD A. MULLER.

Witnesses:

BURTON O. GREGG,
JOSEPH R. GARDNER.