

No. 815,014.

PATENTED MAR. 13, 1906.

PATENTED
F. W. HAYES & C. A. BILLINGS.
PULLING MACHINE FOR STEAMBOATS, &c.
APR 18 1884

APPLICATION FILED JUNE 12, 1905.

2 SHEETS--SHEET 1.

Fig. 1.

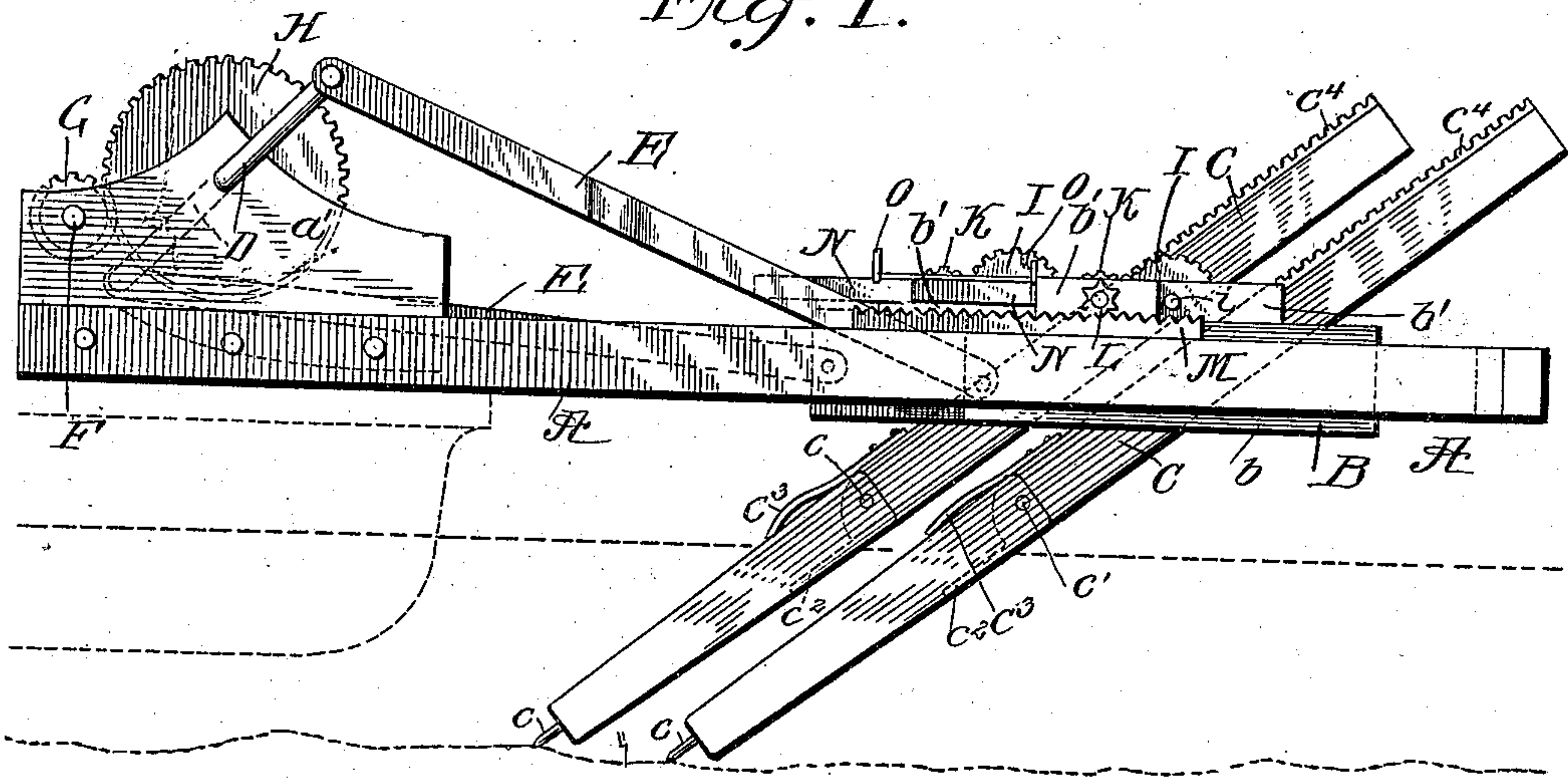
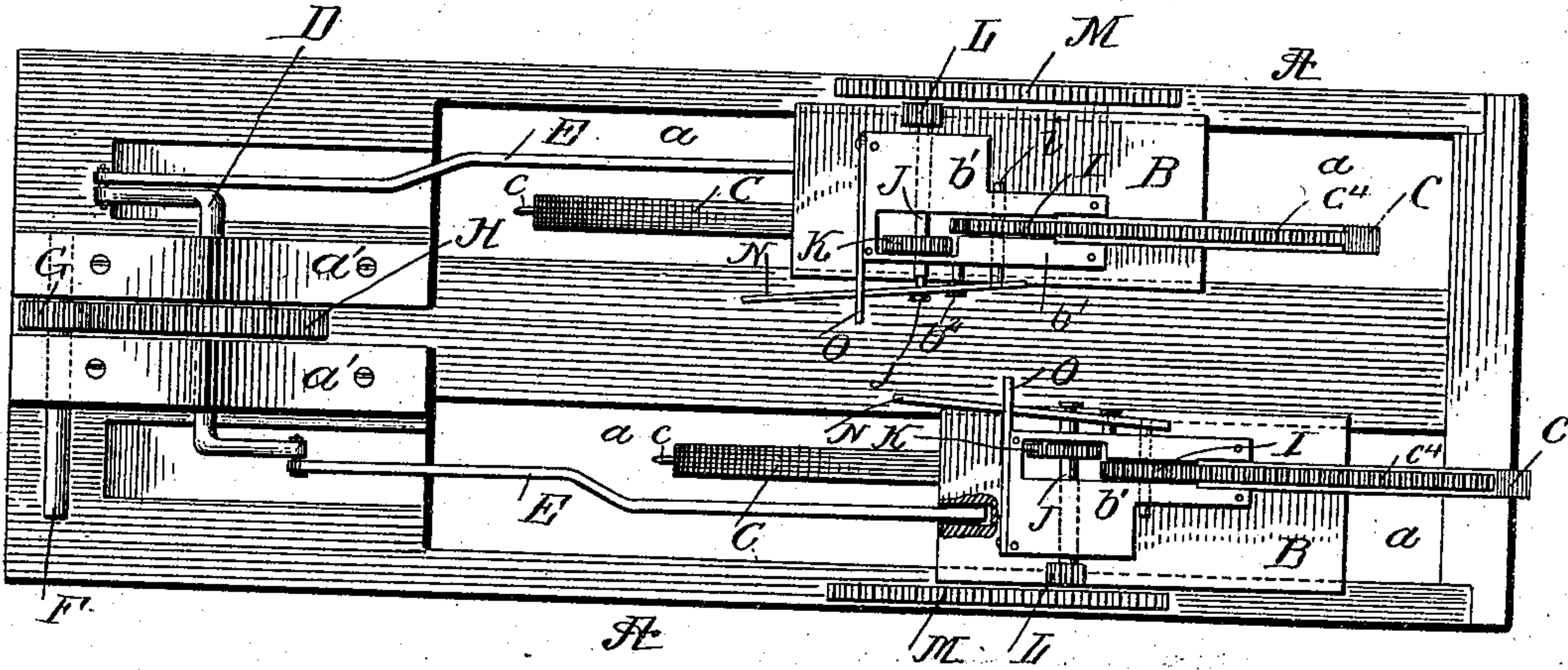


Fig. 2.



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Fig. 3.

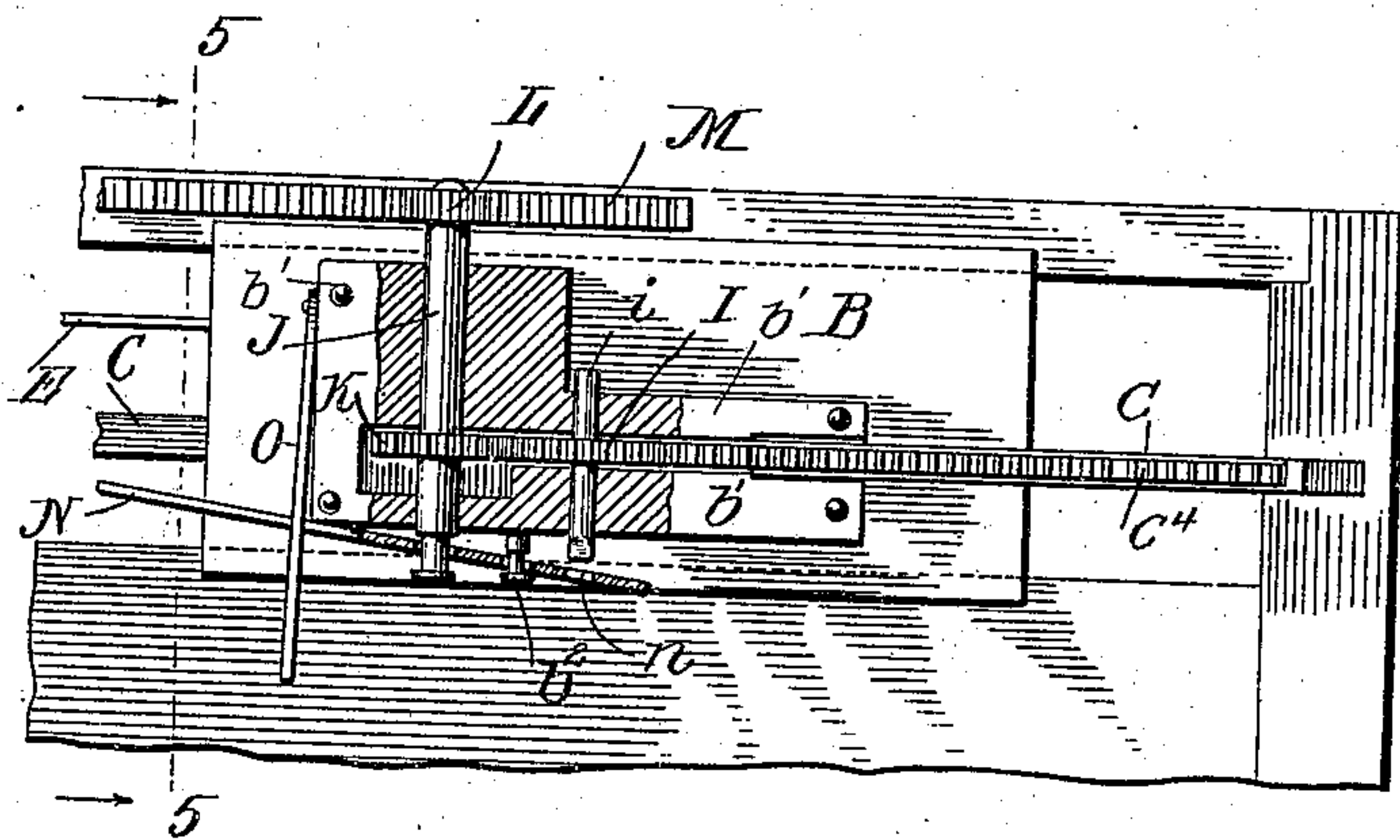


Fig. 4.

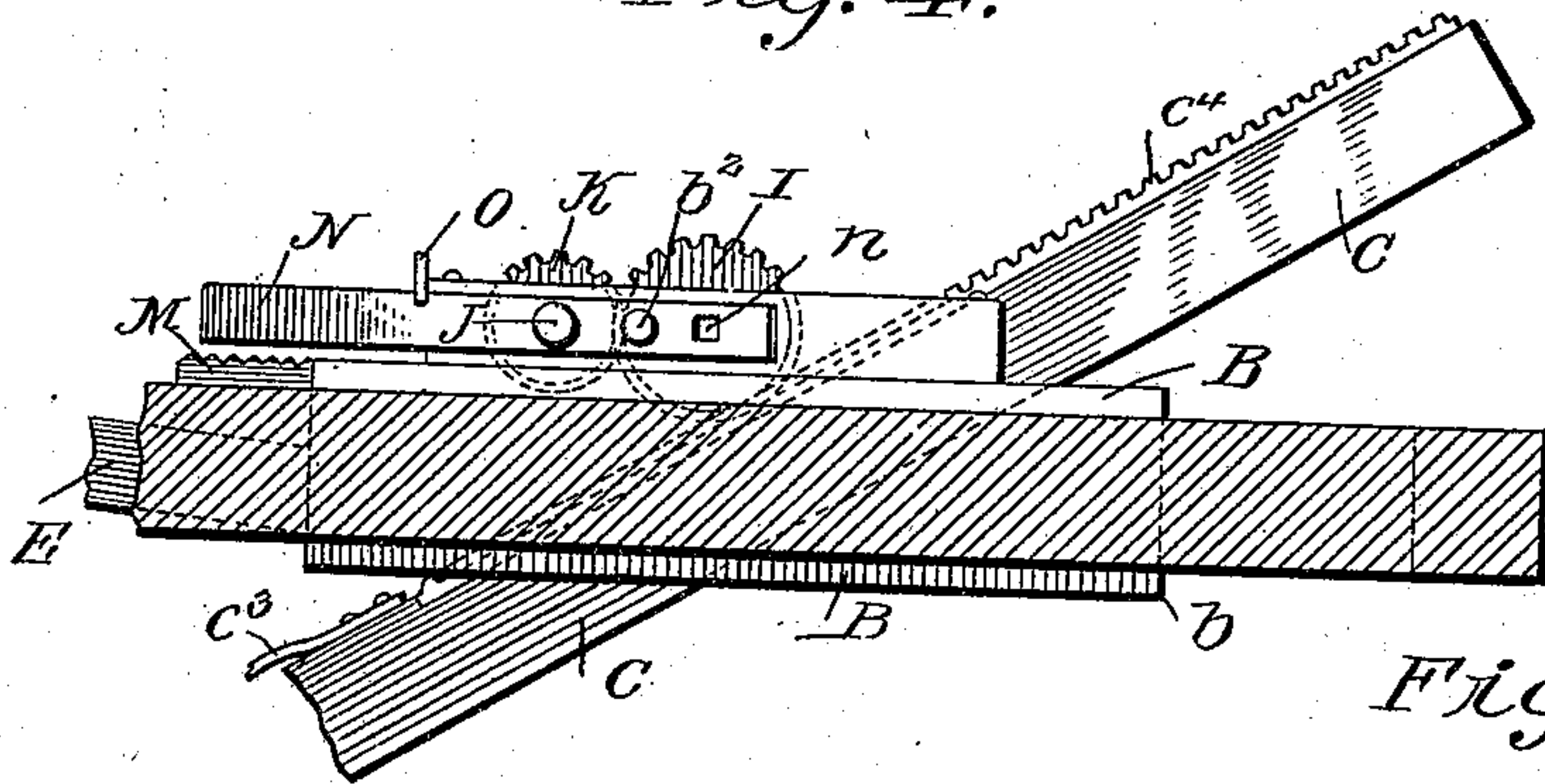
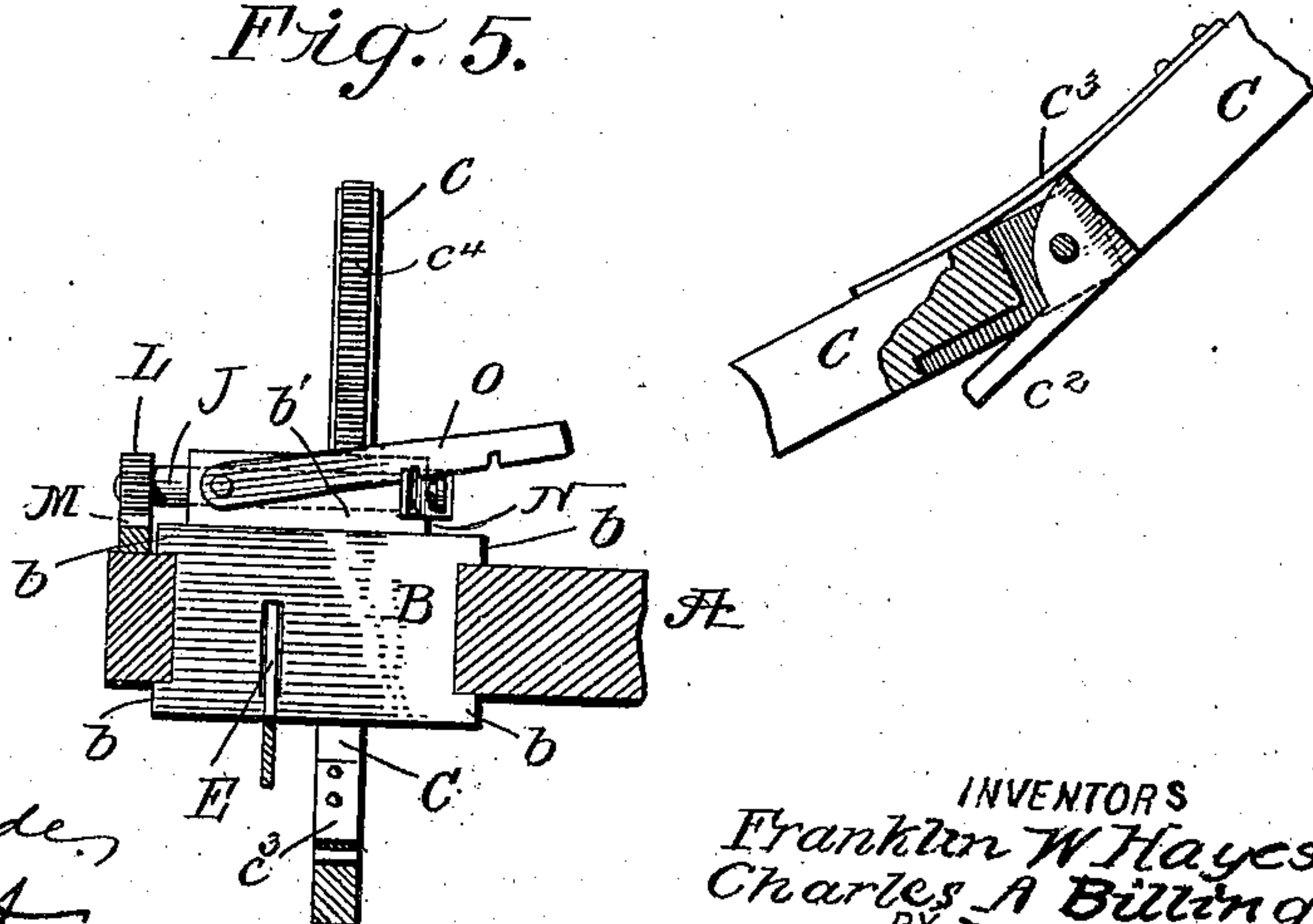


Fig. 6.

Fig. 5.



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UNITED STATES PATENT OFFICE.

FRANKLIN WILLARD HAYES AND CHARLES AUGUSTUS BILLINGS, OF
WENDLING, CALIFORNIA.

PULLING-MACHINE FOR STEAMBOATS, &c.

No. 815,014.

Specification of Letters Patent.

Patented March 13, 1906.

Application filed June 12, 1905. Serial No. 264,970.

To all whom it may concern:

Be it known that we, FRANKLIN WILLARD HAYES and CHARLES AUGUSTUS BILLINGS, citizens of the United States, and residents of Wendling, in the county of Mendocino and State of California, have invented an Improved Boat-Propelling Attachment, of which the following is a specification.

Our invention is an attachment for steamboats and other water-craft for use as an aid or accessory for propelling them up swift streams or rapids, where the usual means of propulsion are insufficient.

The invention is also adapted for use as the sole means of propulsion of boats or scows in canals or sluggish and shallow streams.

The invention is hereinafter described in detail and the novel features specifically indicated.

In the accompanying drawings, Figure 1 is a side view of our invention. Fig. 2 is a plan view of the same. Fig. 3 is a plan view of a portion of the attachment or apparatus, showing a portion of the gearing in a different position from that illustrated in Fig. 2. Fig. 4 is a longitudinal section of a portion of the apparatus. Fig. 5 is a vertical cross-section on the line 5 5 of Fig. 3. Fig. 6 is a detail view of a portion of the apparatus.

An oblong rectangular frame A is in practice secured to the bow of a steamboat or other water-craft, and the same is suitably braced and strengthened by means of iron bolts and straps. The portion of the frame projecting beyond the bow of the boat is provided with two spaces or slots *a*, which are arranged parallel and in each of which a block or bearing B is adapted to slide, the same having parallel flanges *b*, (see Fig. 5,) which embrace the adjacent portions of the frame, forming opposite sides of a slot or space *a*. To each of the blocks or bearings B is attached a push bar or pole C, which is inclined in position, as shown in Fig. 1, and whose lower end engages the bottom of the stream or other body of water, it being there provided with a spike *c* to furnish a secure hold. The two slide-bearings B, and with them the respective push-bars C, are actuated or propelled simultaneously in opposite directions by means of a double crank-shaft D and rods E. As shown in Fig. 2, the crank-arms of the shaft D project in diametrically opposite directions. The bearings of said shaft are in

raised blocks or abutments *a'*, that are secured to the main frame A near its inner or rear end. Rotation is imparted to the shaft D from a driving-shaft F through the medium of a pinion G, that engages a large spur-gear H on shaft D. The shaft F is driven by a motor or any suitable means either connected with an engine on the boat or used independently thereof, as the case may be.

The push-bars C are each made in two parts, which are joined together at a point below the framework A, as indicated at *c'*. The form of joint is practically such as is commonly known as a "rule-joint," (see Fig. 6,) the lower portion or member of each push-bar having a shoulder which abuts a corresponding shoulder on the upper member and the latter being further provided with an extension or lug *c''*, which bears on the forward side of the lower member, and when the two members are alined it lies in a slot or groove in the lower member. A plate-spring *c'''* is applied on the opposite or rear side of each upper member, and its free end bears on the adjacent portion of the lower member, as shown in Figs. 1 and 6. The object of these joints is to enable the lower members of the push-bars to bend backward when the slide-bearings B are pushed forward, so as to pass easily over stones, ridges, or other obstructions on the bottom of the stream. It will now be apparent that if the motor-shaft F be driven the rotation of the crank-shaft D will impart a sliding and reciprocating movement to each of the blocks or bearings B, one advancing as the other is retracted, and vice versa. Thus one push-bar is carried forward and engages the bottom of the stream, while the other is drawn backward and serves to exert traction for pulling the boat forward.

It will be understood that the push-bars C are always held at a suitable inclination—say forty-five degrees, as indicated—and they must obviously be adapted for vertical adjustment according to the depth of the stream in order to work effectively. For this purpose we employ the following-described mechanism: Each of the push-bars C is provided on its rear side with a metal rack-bar *c''''*, with which a small spur-gear I is in constant engagement. Such gear is journaled in a raised block *b'*, secured upon a bearing B. Parallel to the shaft *i* of the gear I is arranged a longer shaft J, that is adapted

to slide longitudinally in the block b' . The same is provided with a pinion or small gear K, which is adapted to mesh with the gear I, and also with a spur-pinion L, which is similarly adapted for engagement with a rack M, fixed on the side bar of the frame A. As shown in Fig. 2, the pinions K and L are out of engagement with the gear I and rack M, respectively, the shaft J being slid inward for this purpose; but in Fig. 3 the shaft J is shown slid outward or in the opposite direction, and thus the pinions K and L are engaged with the gear I and rack M. The former arrangement—to wit, that shown in Fig. 2—is the one required when the attachment is in operation, and that shown in Fig. 3 is the one required when it is desired to adjust a push-bar C higher or lower. When the parts are adjusted as shown in Fig. 3, it will be seen that by moving the bearing B in one direction or the other the shaft J will be rotated by reason of the engagement of its pinion L with the rack M, and consequently the gear I will be rotated, because it is in mesh with the pinion K on said shaft J, and in turn such rotation of the gear I will move the push-bar up or down, according to the direction of the movement of the bearing B.

It will now be seen that by causing partial or complete rotation of the crank-shaft D the bearings B may be moved to any extent required to adjust the push-bars as conditions require. For rocking the sliding shaft J in the position shown in Fig. 3, which is requisite during the time the required adjustment of the push-bars is being made, we employ a lever N, which is pivoted upon the stud b^2 , fixed in the side of the block b' . (See especially Fig. 3.) The shaft J is suitably engaged with such lever N, and consequently by oscillating the latter in a horizontal plane the shaft J may be adjusted in one direction or the other to throw it into or out of gear. For locking the lever N in either of the two positions indicated in Figs. 2 and 3 we employ a pivoted drop latch or catch O, (see Fig. 5,) the same having notches for engaging the lever N, as shown. When the lever is adjusted in the position shown in Fig. 2, or, in other words, in position to slide the shaft J inward, so that its pinions K and L will be out of engagement with the spur-gear I and rack N, its forward end is necessarily thrown inward or close to the adjacent side of the block b' . Such end portion of the lever N is provided with a rectangular opening n , adapted to receive the corresponding polygonal end of the shaft i , upon which the gear I is keyed. Consequently when the lever N is in the position shown in Fig. 2 the polygonal end of the shaft i enters the opening n , and the shaft is thereby locked, and consequently the adjacent push-bar is also locked, and, contrariwise, the lever N is thrown into the position indicated in Fig. 3, which is out of engage-

ment with the shaft i of gear I, and consequently the latter is free to rotate and the adjacent push-bar is released and free to slide vertically. In brief, by the simple adjustment of the two levers N from right to left, or vice versa, the push-bars C may be locked so as to be immovable while the apparatus is in use or may be unlocked and put in gear with the means for adjusting them higher or lower.

What we claim is—

1. The improved attachment for water-craft for the purpose specified, comprising a frame adapted for attachment to the craft and to project forward thereof, the same having parallel slots or guideways, bearings adapted to slide therein, a double crank-shaft and connecting-rods for reciprocating such bearings, simultaneously, in opposite directions, and push-bars connected with such bearings and extending downward therefrom at a rearward inclination, and means for adjusting them higher or lower corresponding to the depth of the stream being navigated, substantially as described.

2. In an apparatus for the purpose specified, the combination, with a frame having parallel longitudinal guideways, of bearings adapted to slide in the latter, means for imparting simultaneous reciprocation to the bearings in opposite directions, push-bars attached to the bearings and projecting downward at a suitable angle and provided with joints adapting their lower parts to bend backward as the bearings are pushed forward, racks applied to the push-bars and the side portions of the frame, and gearing including a slidable shaft which is adapted for adjustment for locking the push-bars in any required position and for shifting them vertically as conditions may require.

3. In an apparatus for the purpose specified the combination, with a frame adapted for attachment to the bow of a water-craft and having a lengthwise guide, of a bearing adapted to slide on such guide, means for reciprocating it, and a push-bar connected with the bearing and projecting downward therefrom at a rearward inclination, substantially as described.

4. In an apparatus for the purpose specified, the combination, with a frame adapted for attachment to the bow of a water-craft and having a lengthwise guide, of a bearing adapted to slide on such guide, means for reciprocating it, a push-bar connected with the bearing and projecting downward therefrom at a rearward inclination and means for locking such push-bar in any required adjustment and for adjusting it higher or lower as conditions may require.

5. In an apparatus for the purpose specified, the combination, with a frame having a side rack and adapted for attachment to the bow of a water-craft, and having a longitudi-

nal guideway, of a bearing adapted to reciprocate in said frame, a push-bar extending downward through a slot in the bearing and projecting rearward at a suitable inclination for engagement with the bottom of the stream, a rack applied to such push-bar, a gear engaging the rack-bar and having a shaft provided with a polygonal head, a parallel shaft adapted to slide in its bearings and having pinions adapted for engagement with the aforesaid gear and the rack on the frame, and a lever connected with the slidable shaft and also adapted for engagement with the polygonal shaft for use in adjusting the gear for locking the push-bar or for adjusting it vertically, as conditions may require.

6. In an apparatus for the purpose specified, the combination with a frame and a slide-bearing therein, of a push-bar extending through the bearing and inclined rearward, a rack applied to the push-bar, a gear engaging the same and supplemental gearing for use in adjusting the push-bar higher or lower, a le-

ver for throwing the gearing into or out of action, and a locking device for engaging such lever and holding it in either of the two required positions, substantially as described.

7. In an apparatus for the purpose specified, the combination, with a frame having guideways, of bearings adapted to reciprocate therein, push-bars passing down through such bearings and formed in two longitudinal sections or members which are connected by a rule-joint, and springs applied on the rear side of the joints whereby the lower members of the push-bars are adapted to bend backward upon meeting an obstruction when the bearings are pushed forward, substantially as described.

FRANKLIN WILLARD HAYES.
CHARLES AUGUSTUS BILLINGS.

Witnesses:

E. R. NEIL,
V. R. RAWLES.

It is hereby certified that in Letters Patent No. 815,014, granted March 13, 1906, upon the application of Franklin Willard Hayes and Charles Augustus Billings, of Wendling, California, the title of the invention should read *Boat-Propelling Attachments* instead of "Pulling-Machines for Steamboats, etc.;" and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 24th day of April, A. D., 1906.

[SEAL.]

E. B. MOORE,
Acting Commissioner of Patents.