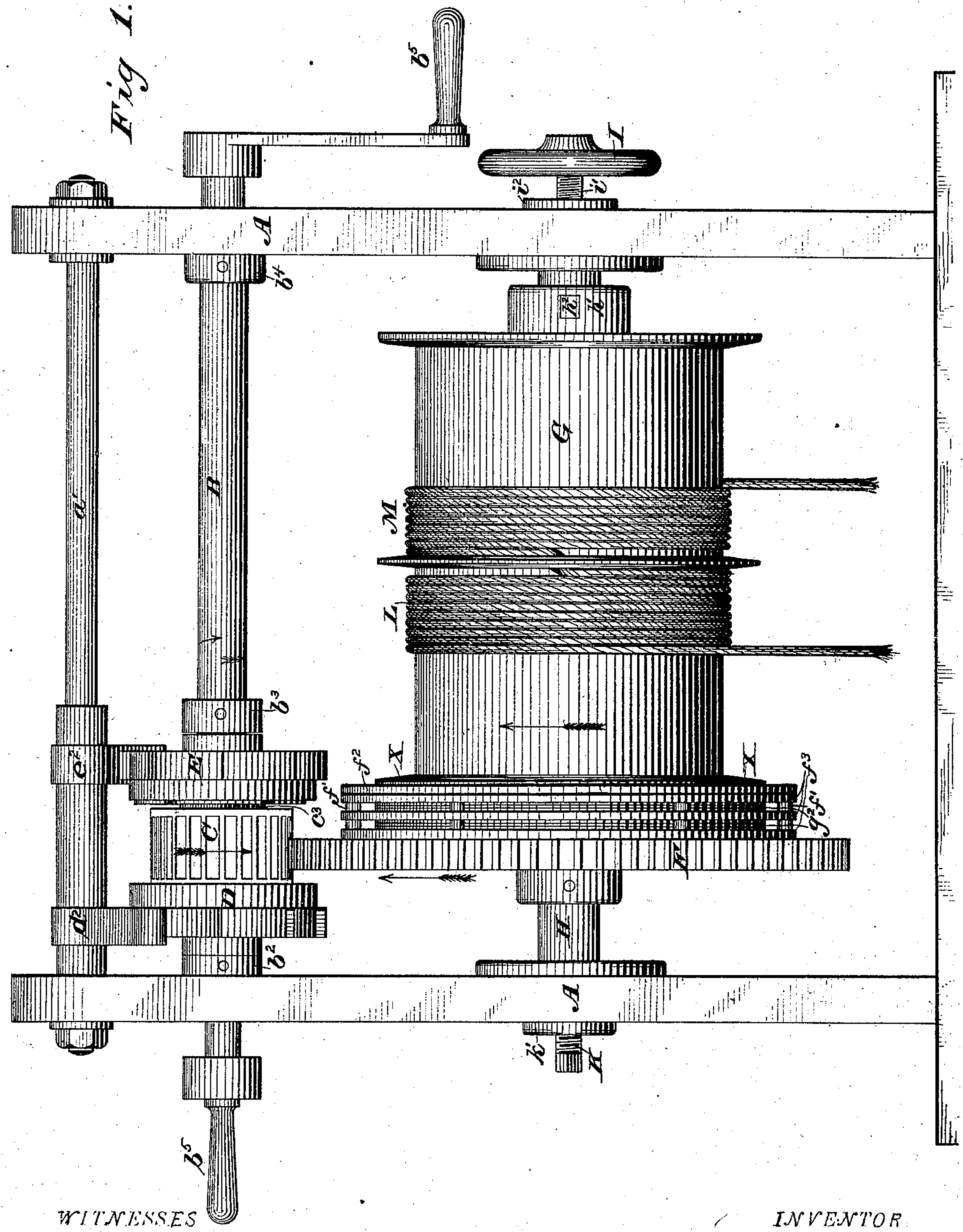
T. A. WESTON.

Reversing Friction Clutch and Brake.

No. 217,032. Patented July 1, 1879.

Fig 1.



WITNESSES

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3 Sheets—Sheet 2.

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Fig. 2.

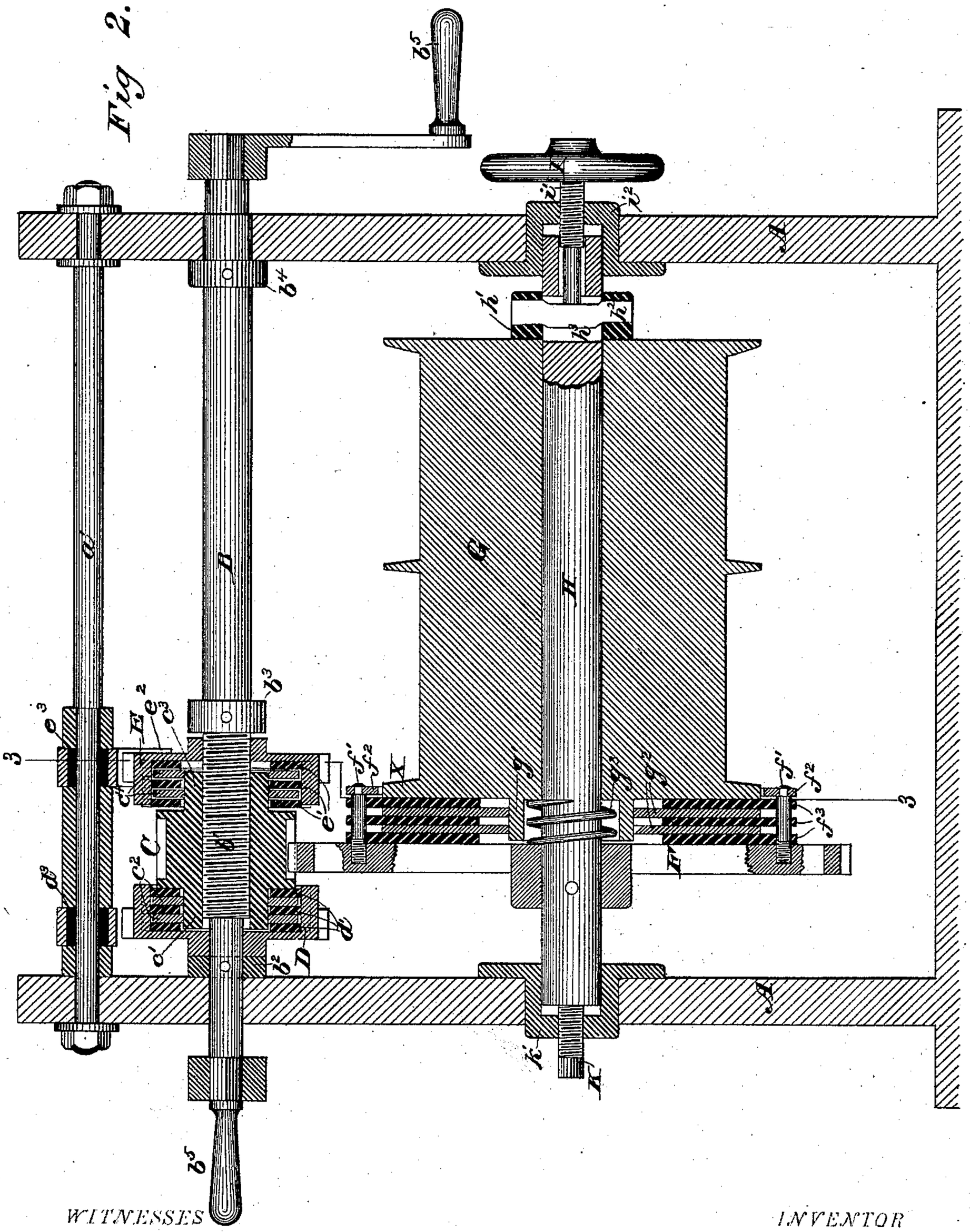

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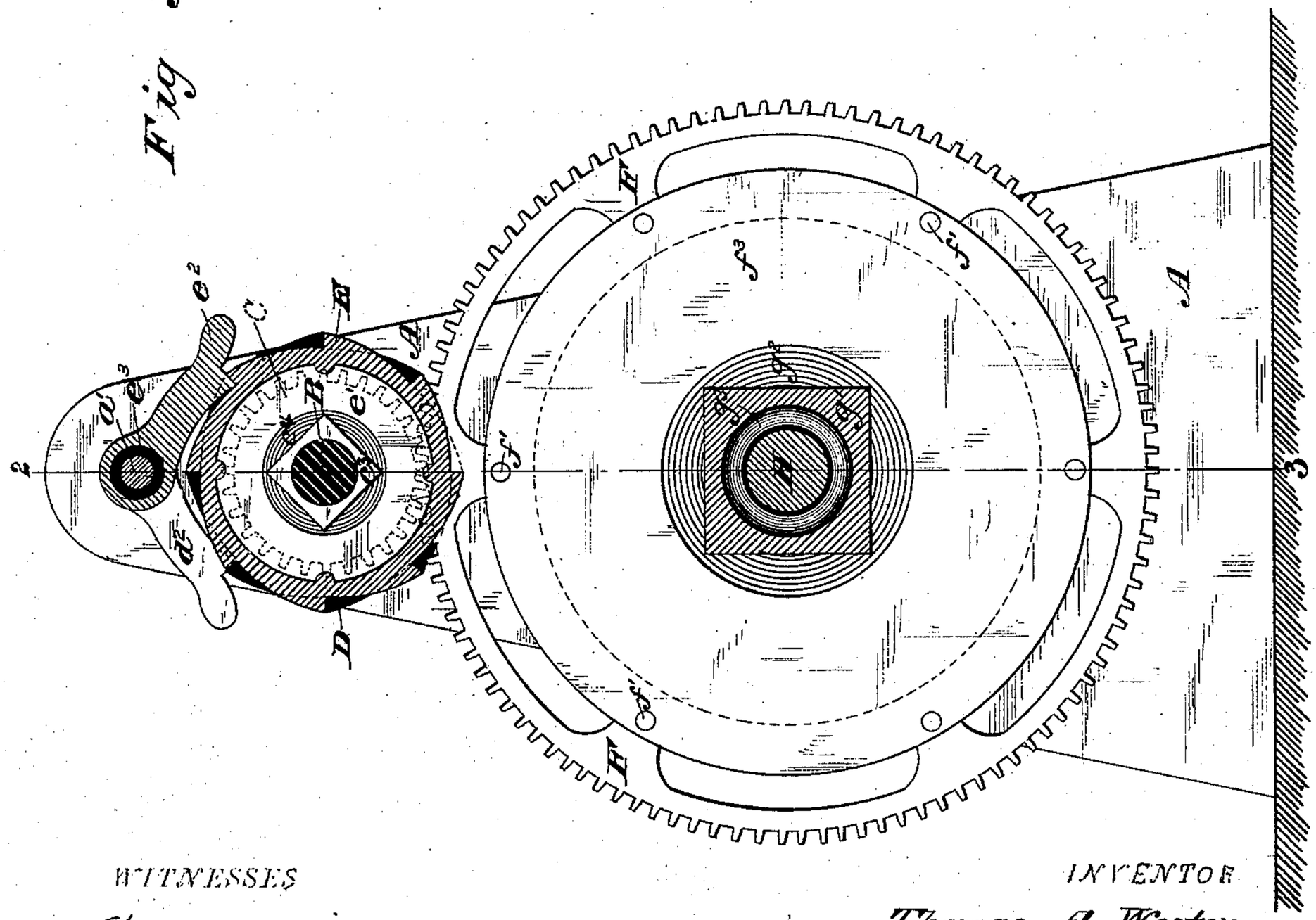
Fig 3.



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UNITED STATES PATENT OFFICE.

THOMAS A. WESTON, OF STAMFORD, CONNECTICUT, ASSIGNOR TO THE YALE LOCK MANUFACTURING COMPANY, OF SAME PLACE.

IMPROVEMENT IN REVERSING FRICTION CLUTCH AND BRAKE.

Specification forming part of Letters Patent No. **217,032**, dated July 1, 1879; application filed August 26, 1878.

To all whom it may concern:

Be it known that I, THOMAS A. WESTON, of Stamford, in the county of Fairfield and State of Connecticut, have invented certain Improvements in Reversing Brake Clutches for Machinery, of which the following is a specification.

My invention consists, mainly, of certain improvements in the devices of my Letters Patent of the United States No. 75,227, dated March 3, 1868, and No. 98,000, dated December 14, 1869. It is applicable, primarily, to hoists, but may also be applied to other machinery.

In the accompanying drawings is represented my invention applied to a peculiar hoisting apparatus, which I do not intend to comprehend in this patent, but intend to make the subject of a separate patent.

Figure 1 is a longitudinal elevation of a hoisting-machine embodying my invention. Fig. 2 is a longitudinal section, and Fig. 3 a vertical section on the line 3 3 of Fig. 2.

A is an ordinary supporting-frame. a^1 is a stay-bar uniting the frame-sides and furnishing a bearing for the ratchet-pawls. B is the pinion-shaft. b^1 is a right-hand screw-thread cut thereon. b^2 b^3 b^4 are fixed collars. b^5 are cranks. C is a spur-pinion, internally screw-threaded to engage with and traverse upon the screw b^1 of the shaft. c^1 is a square boss upon that end of the pinion which, for convenient reference, is called the "right-hand" end, and placed thereon are the friction-disks c^2 of my aforesaid Letters Patent. c^3 is a similar square boss upon the left-hand end of the pinion, and thereon are disks c^4. D is the right-hand ratchet-drum, containing disks d^1. d^2 is the right-hand pawl, which has its fulcrum or eye enlarged, so as to contain an elastic bush or cushion, d^3, which forms a thrust-bearing for the pawl upon the stay-bar a^1. E is the left-hand ratchet-drum, containing disks e^1. e^2 is the left-hand pawl, and e^3 its cushioned bearing. The teeth of the spur-pinion C may engage with the main spur-wheel of a hoisting-machine, or with any wheel forming one of a train of gearing by which the hoist or other machine is operated, and which may be then driven in either direction by this my improved reversing-gear.

The objects of my invention are to render my aforesaid patented devices available in combination with a spur-pinion or train of gearing for driving the said pinion or gearing in either direction, the said driving action in each direction being automatically self-checked or self-arrested the instant the motive force ceases, and in both directions of rotation to furnish a safety backward motion, also self-checked or self-arrested when the driving force is withdrawn, and, further, to render the said motions automatically reversible when the direction of rotation in the pinion-shaft is reversed.

The operation is as follows: Suppose the teeth of the pinion C to engage with the spur-wheel of a hoisting or other machine requiring to be driven, and the pinion-shaft B to be then turned in the direction of the arrows. At first the pinion is prevented from rotating with its shaft by the resistance of the spur-wheel, and during this time the rotatory motion of the shaft within the stationary pinion by means of their screw-threads forces the pinion longitudinally against the disks in the ratchet-drum D, frictionally connecting them. When the frictional connection thus obtained between the disks is sufficient to transmit through them the rotatory driving motion of the shaft B to the pinion C, all relative motion between the shaft and pinion ceases, the said shaft and pinion then serving to drive the hoisting or other machine as long as desired. Upon ceasing to drive, any backward motion or recoil is arrested by the pawl d^2 and ratchet-teeth upon the drum D. Upon reversing the rotatory driving motion of the shaft B, the first effect is the withdrawal of the coupling pressure from the disks within the drum D. The pinion C, being for the moment stationary, is screwed backward from its pressure upon the said disks; but so soon as their frictional connection is broken or diminished sufficiently, the strain of the supposed load at once rotates the pinion upon its screw-threaded shaft and restores the coupling pressure upon the disks, again arresting backward motion, unless

the shaft B be continually turned, when the pinion will continually follow its rotations. If the machine be a hoist, a load may thus be lowered by the continual backward rotation of the shaft B, the lowering, however, being self-arrested always when the rotation of the shaft B ceases. Now, suppose the load removed and another applied, to overcome which the shaft B and pinion must drive in a contrary direction to the arrows. Such rotation of the shaft B will propel the pinion away from the drum D, leaving the latter loose and free, and screw the said pinion with its disks c^4 into frictional connection with the disks e^1 of the ratchet-drum E. Further rotation of the shaft and pinion will drive the connected gearing so long as required. Upon ceasing to drive, all recoil or running backward is prevented by the pawl e^2. When reversing the driving motion of the shaft and turning it, as indicated by the arrows, the pinion and its sustained load will follow and be self-checked when such backward driving ceases in like manner to the corresponding motion and action first explained with reference to the drum D and connected parts. Thus the driving action of the pinion C and its self-arrested and safety lowering motions in contrary directions are automatically reversible when the direction of rotation in the shaft is reversed.

I am aware that a yielding or spring-cushioned pawl is not a novelty, broadly, my improvement therein consisting of placing the elastic material within the eye or pivoted end of the pawl, so as to be securely covered in from accidental removal or injury, affording compactness of form, and leaving the pawl, as before, a simple casting or forging in one piece.

Although I have described my invention as constructed with the friction-disks of my United States Letters Patent No. 75,227, of 1868, they may be omitted, and the single friction-faces of the ratchet-wheel and pinion end be compelled to bear the whole of the frictional action. Such a construction, however, would only be suited to light duty, and even then lose the smoothness of action due to a larger area of frictional surfaces; whereas by means of the aforesaid duplicated or repetition disk-surfaces any desired frictional area is obtained, as explained in the specification of my said Letters Patent, affording ease, efficiency, and durability in action.

Although I have described my invention as constructed for reversing, the screwed shaft and pinion may be conveniently used for driving and backing or lowering in one direction only, in which case but one of the ratchet-disk drums, D or E, is required, and the pinion would then be plain at one end. The advantages would still accrue of driving the pinion by its internal screw-threads, instead of by an external screw-faced boss, as described in the specification of my aforesaid United States Letters Patent No. 98,000, of 1869, thus saving the use of the incline-faced collar, gaining compactness, and obtaining a positive screwing motion to retire the pinion from frictional contact with the ratchet wheel or drum, thereby securing its more immediate and certain release in backing or lowering when the device is employed in a hoisting-machine.

I claim as my invention—

1. In a friction-brake clutch, the combination of the screw-threaded shaft B, internally screw-threaded pinion C, and ratchet wheels or drums D E, with their pawls, substantially as described.

2. In a friction-brake clutch, the combination of the screwed shaft B, pinion C, and ratchet wheels or drums D E, with their pawls and the contained friction-disks, substantially as described.

3. In a friction-brake clutch, the combination of the screw-threaded shaft B and internally screw-threaded pinion C with one ratchet-wheel, D, and pawl, substantially as described.

In testimony whereof I have hereunto subscribed my name.

THOS. A. WESTON.

Witnesses:

M. S. HOPKINS,

WM. J. PEYTON.