

No. 607,692.

Patented July 19, 1898.

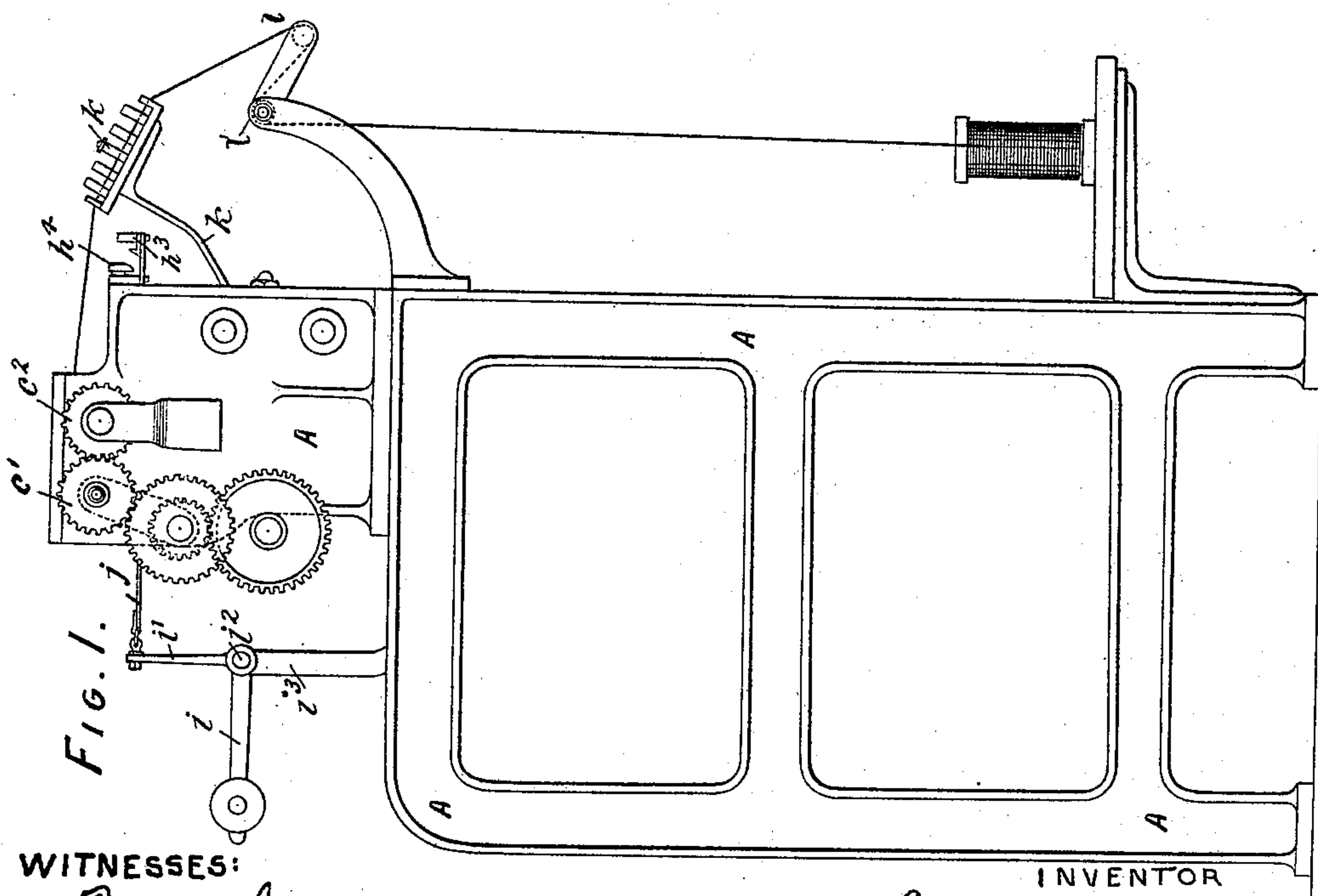
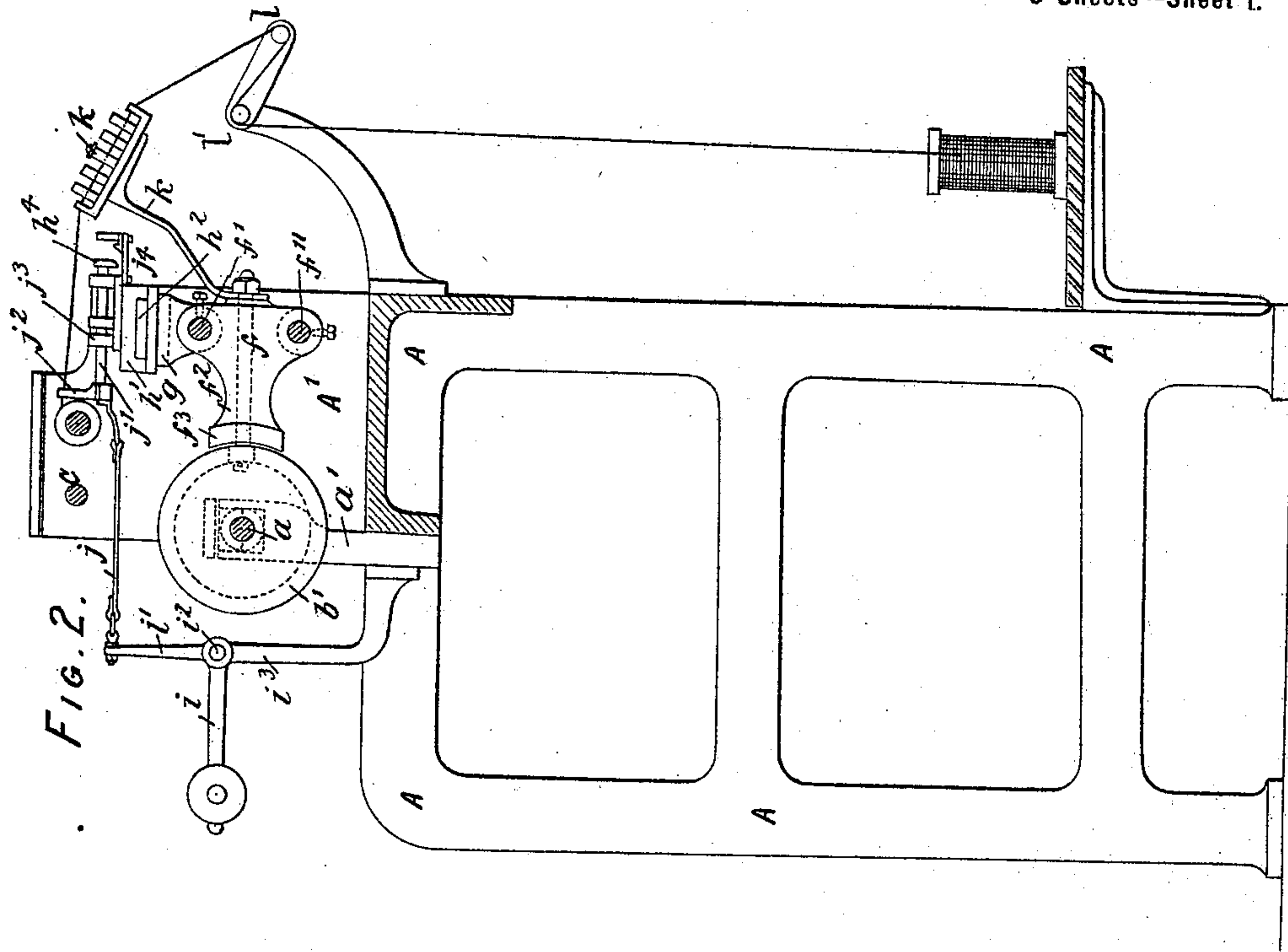
B. M. KNOX.

WINDING MACHINERY FOR THREAD, YARN, &c.

(Application filed June 19, 1897.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

F. W. Wright.
S. C. Connor

INVENTOR

Bruce Muir Knopf
BY *Howson and Howson*
HIS ATTORNEYS.

No. 607,692.

Patented July 19, 1898.

B. M. KNOX.

WINDING MACHINERY FOR THREAD, YARN, &c.

(Application filed June 19, 1897.)

(No Model.)

3 Sheets—Sheet 2.

FIG. 3.

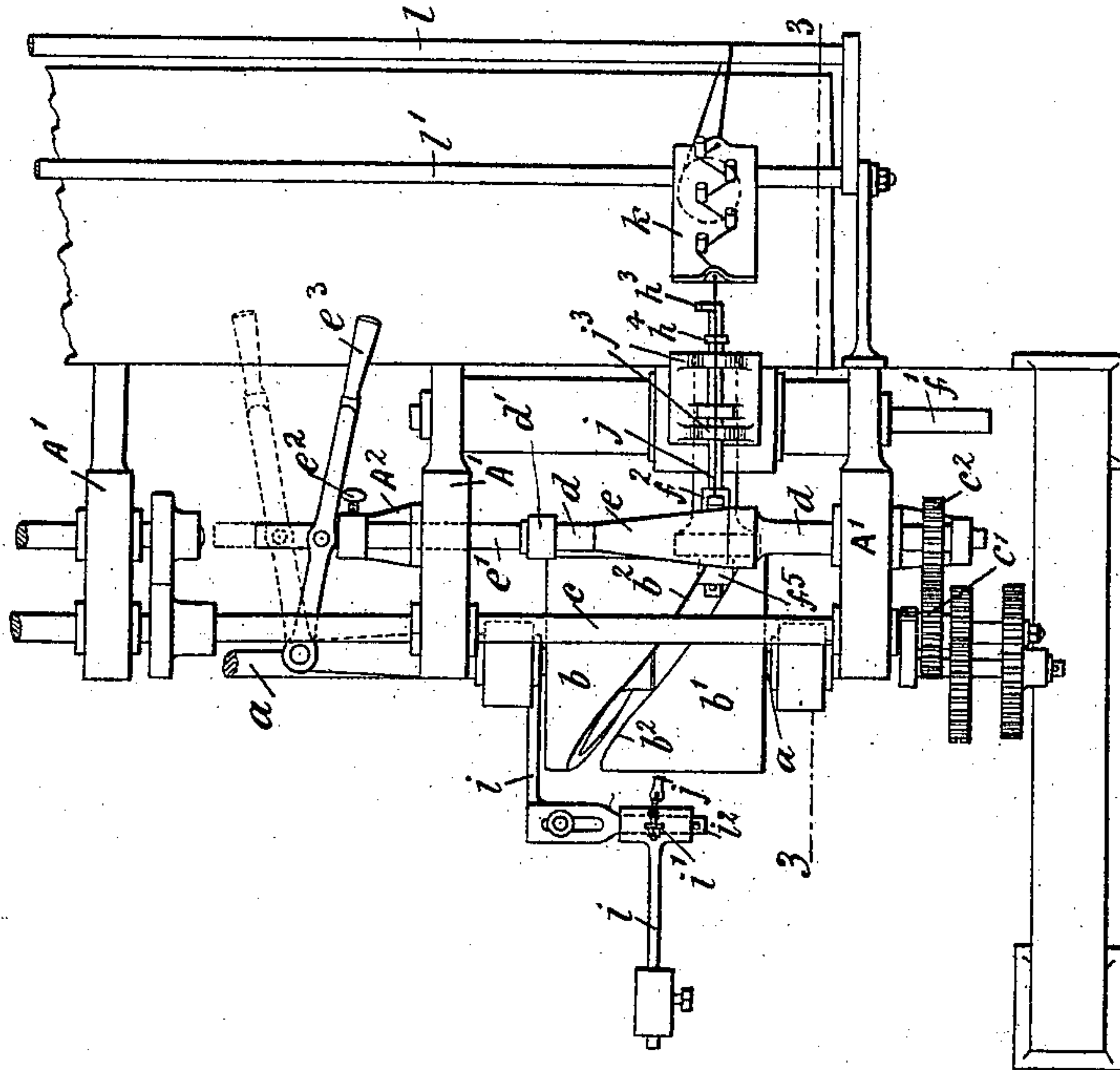
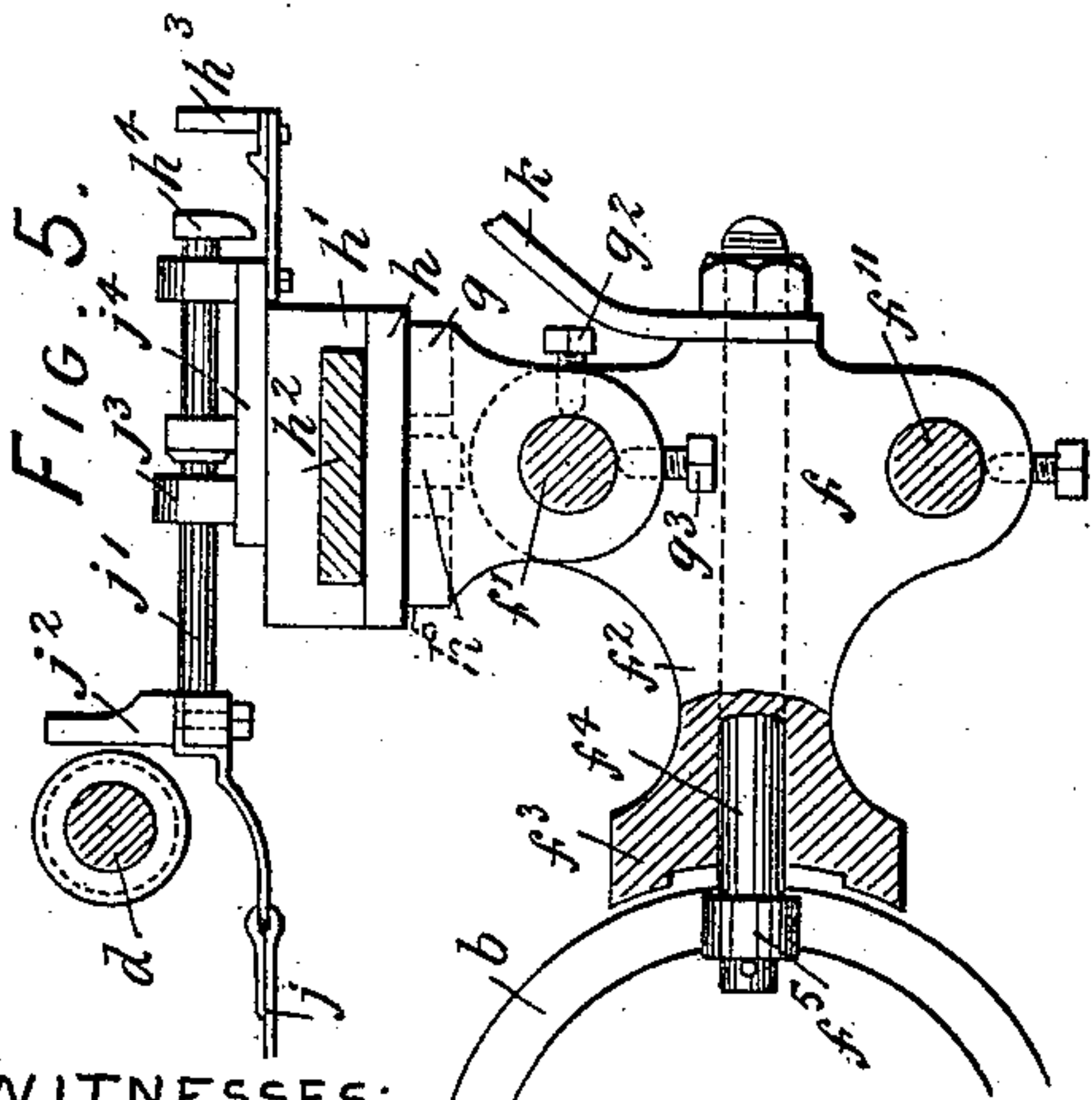
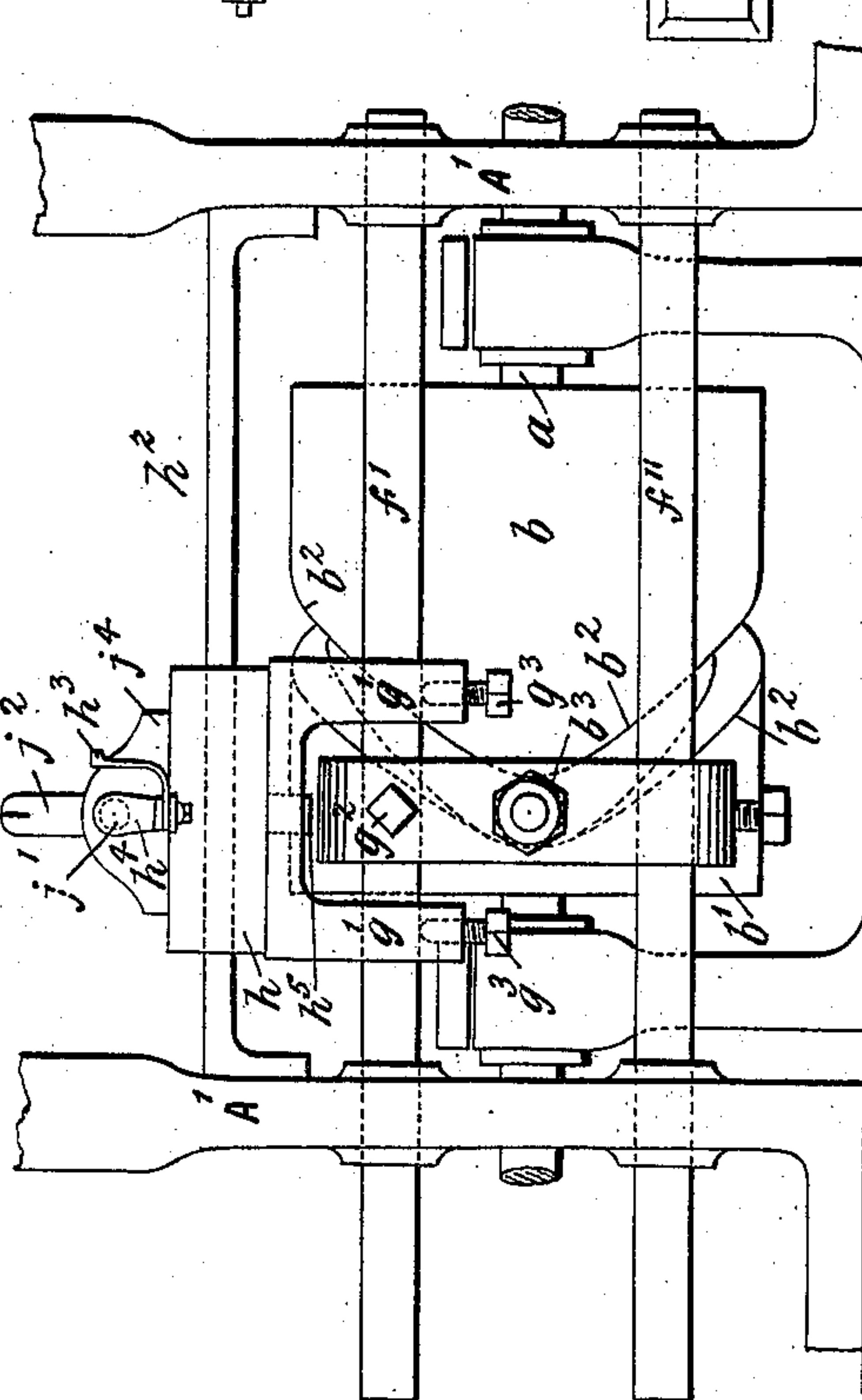


FIG. 4.



WITNESSES:

F. W. Wright.
S. C. Connor

INVENTOR

BY *Bryce Muir Knox*
Howton and Howton
HIS ATTORNEYS

No. 607,692.

Patented July 19, 1898.

B. M. KNOX.

WINDING MACHINERY FOR THREAD, YARN, &c.

(Application filed June 19, 1897.)

(No Model.)

3 Sheets—Sheet 3.

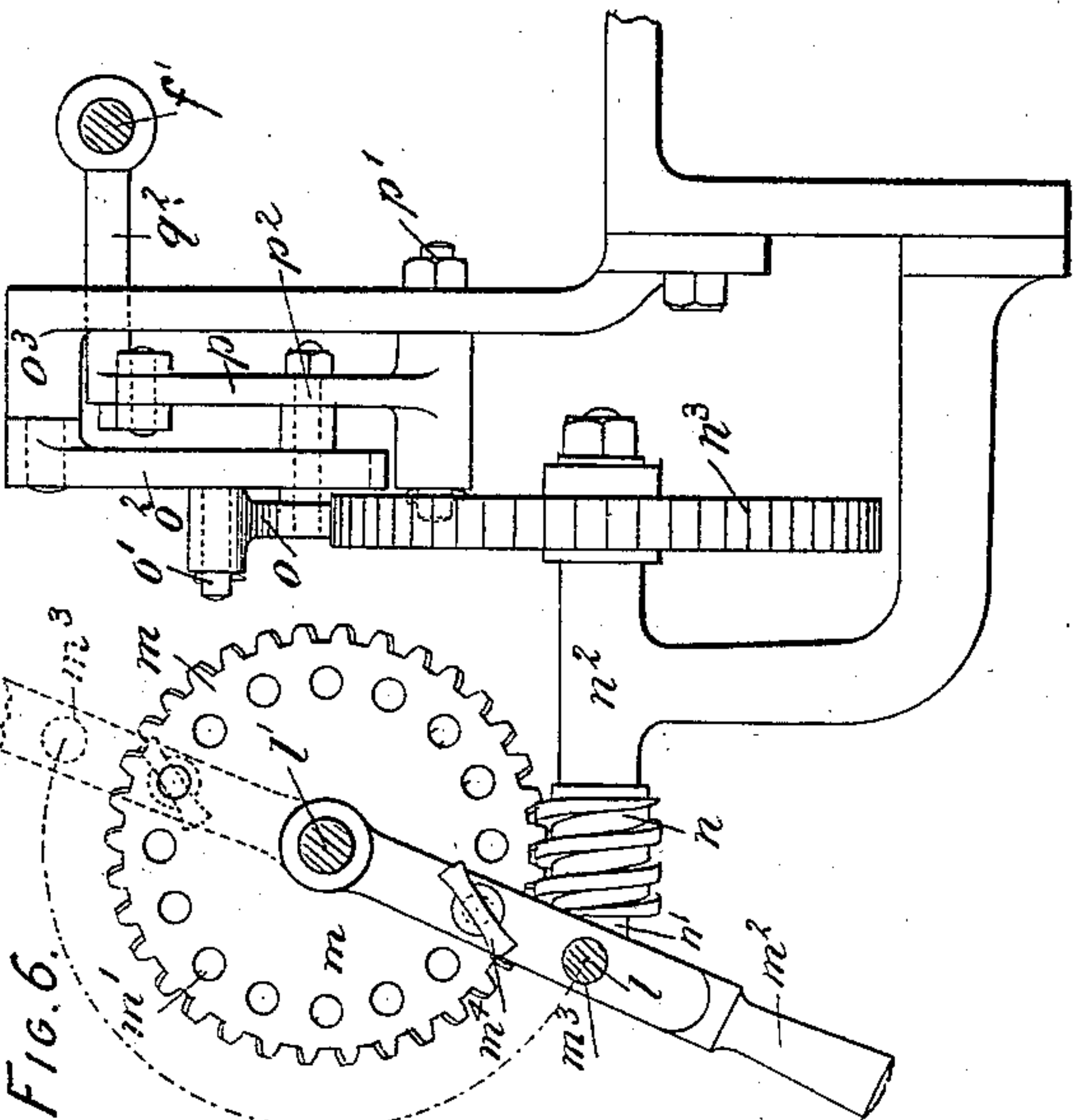
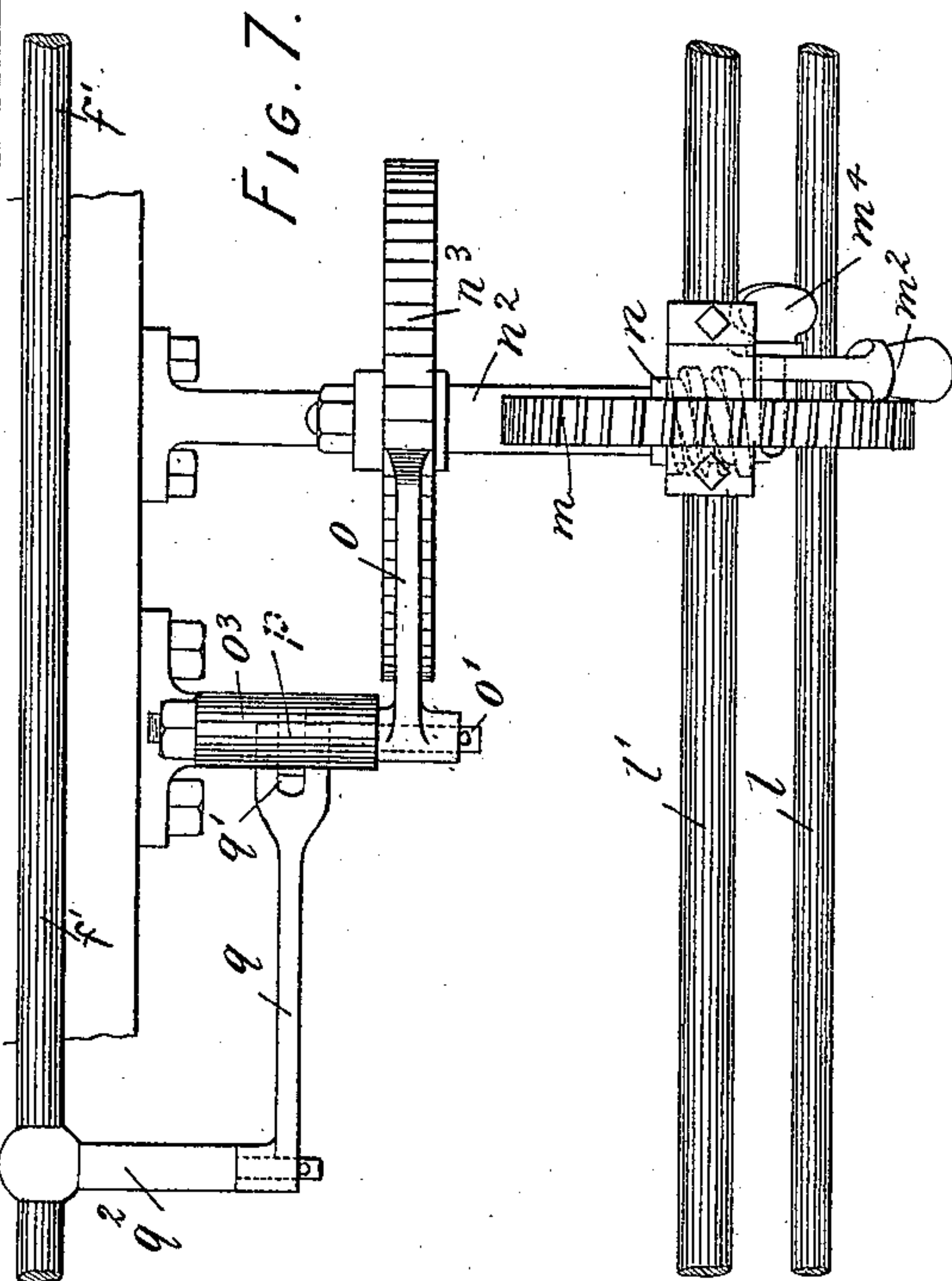
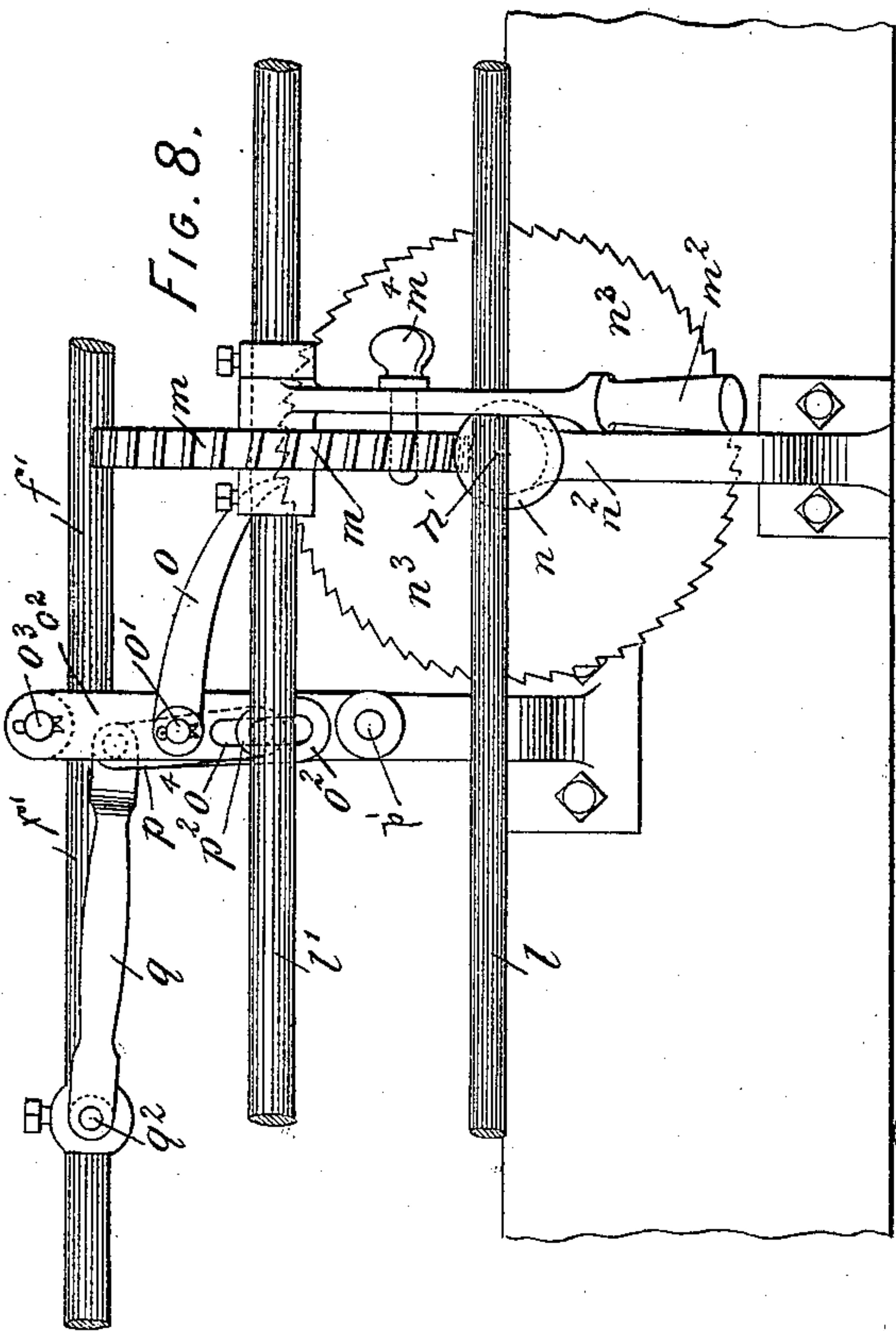


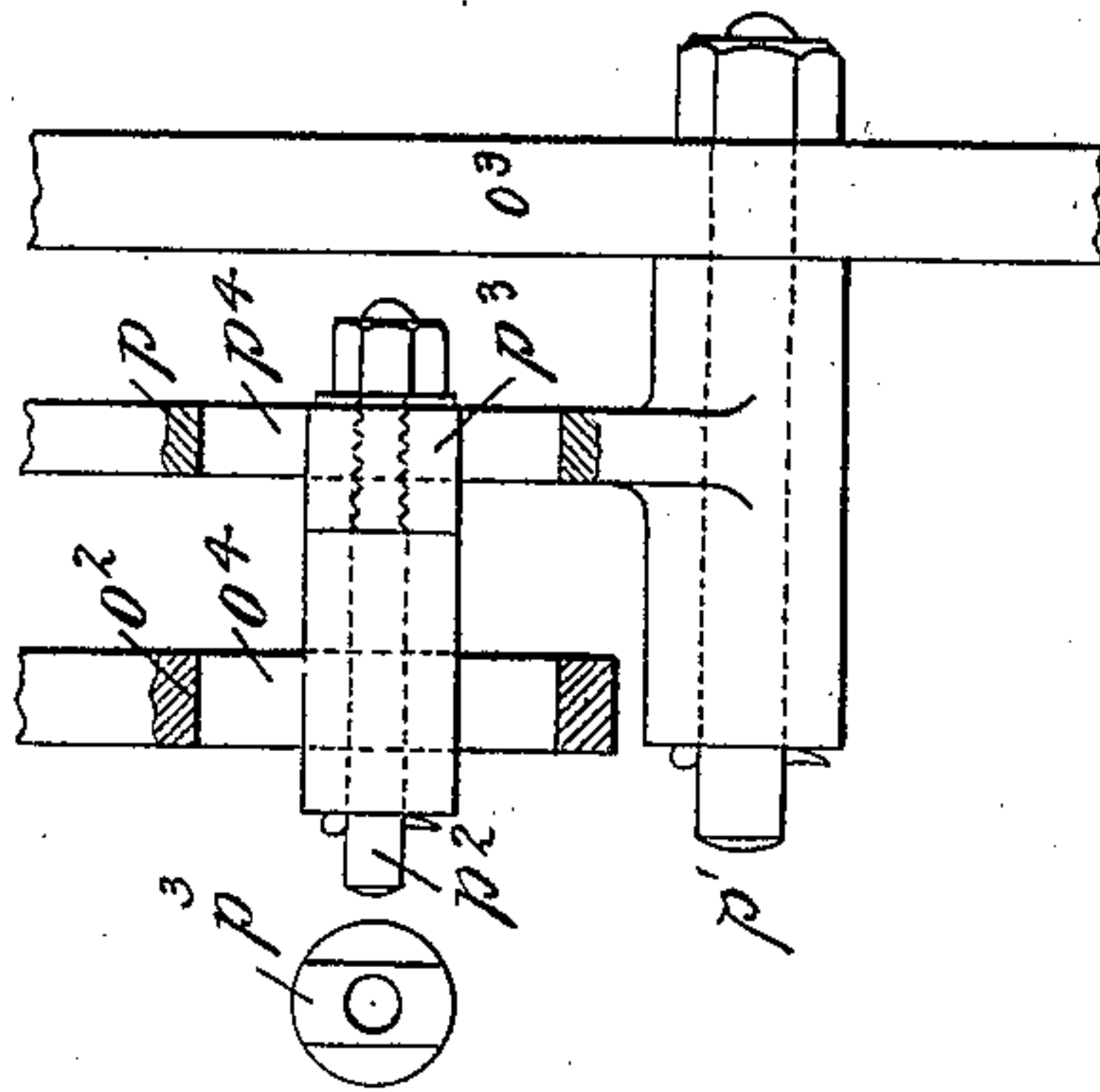
FIG. 6.

WITNESSES:

J. W. Wright

C. Connor

FIG. 9.



INVENTOR

Bryce Muir Knox

BY

Howson and Howson

HIS ATTORNEYS.

UNITED STATES PATENT OFFICE.

BRYCE M. KNOX, OF KILBIRNIE, SCOTLAND.

WINDING MACHINERY FOR THREAD, YARN, &c.

SPECIFICATION forming part of Letters Patent No. 607,692, dated July 19, 1898.

Application filed June 19, 1897. Serial No. 641,461. (No model.) Patented in England June 10, 1896, No. 12,731.

To all whom it may concern:

Be it known that I, BRYCE MUIR KNOX, of the firm of W. & J. Knox, linen-thread manufacturers, Kilbirnie, county of Ayr, Scotland, have invented certain new and useful Improvements in and Relating to Winding Machinery for Thread, Yarn, and the Like, (for which I have obtained a patent in Great Britain, No. 12,731, bearing date June 10, 1896,) of which the following is a specification.

This invention has reference to improvements in and relating to machinery for winding thread, yarn, and the like on paper or other cops and whereby the material is wound in a series of diamond figures on the cop, half of the diamond being wound the one way and the other half the diagonally opposite way.

The improvements essentially comprise a machine having reciprocating cross-head frames, thread-guides, operating cams and gear, cop holding and detaching spindles, and thread-tension automatic regulating mechanism; and in order that others skilled in the art to which my invention relates may understand how the same may be carried into practice I have hereunto appended three sheets of explanatory drawings, in which the same reference-letters are used to indicate corresponding parts in all the figures where shown.

Figure 1 is an end elevation of a winding-machine as constructed in accordance with my improvements. Fig. 2 is a transverse vertical section of the machine as taken on the line 3 3 of Fig. 3, which is a plan view broken away of part of the machine. Fig. 4 is a detached front view, to an enlarged scale, and Fig. 5 a detached side elevation, of the traversing cross-head, cam, and fittings. Fig. 6 is an end elevation, Fig. 7 a plan view, and Fig. 8 a front elevation, illustrating the mechanism for automatically regulating the tension of the thread, while Fig. 9 is a detached sectional view of same.

Referring to the drawings, the machine consists of a main base-frame A, carrying a series of small frames on top, each consisting of two transverse vertical columns A' at short distances apart. A longitudinal shaft *a* is carried in bearing-brackets *a'*, supported from base-frame A and driven through wheel-gearing and a belt from any adjacent prime mov-

ing shaft. A series of cams are mounted on the longitudinal shaft *a*, one opposite the central part of each small frame A', and each cam is preferably formed in two separate parts *b b'*, fixed on shaft *a* and having an outer annular end surface *b²*, tapering in opposite diagonal directions toward points *b³* at the semi-circumference. A longitudinal shaft *c* is carried in bearings in the small frames A' and is driven through spur-gearing from the parallel cam-shaft *a*, and separate spindles *d*, carried in eye-bearings in each small frame A', are driven through spur-gearing *c' c²* from the aforesaid shaft *c*. The paper tapered cops *e*, on which the thread is to be wound, have their one end secured to the end of these spindles *d*, while their other end is carried on a collar *d'*, mounted loose on a hand-operated spindle *e'*. Each of these latter spindles *e'* is carried in eye-bearings in the cheek-frames A' and projecting brackets A² and is secured firmly to the latter by pinching-pins *e²* when the winding operations are proceeding; but when a cop *e* is to be taken out and replaced the motion of the machine would be stopped by operating the belt-fork, and these pinching-pins *e²* would be slackened and the spindles *e'* made to slide out of and return into working positions by means of a hand-lever *e³*.

A cross-head reciprocating frame *f* has two parallel rods *f'* and *f''* screwed through it, and these rods are mounted in eye-bearings in each of the small frames A' parallel to the longitudinal shafts and receive to-and-fro reciprocating movement, as hereinafter described.

A hollow projecting part *f²* from cross-head *f* has a surface plate *f³* formed on its end to bear on the surface of each cam *b b'*, and a bolt *f⁴* passes through this hollow part of cross-head and an antifriction-pulley *f⁵* on it works between the adjacent outer end surfaces *b²* of the two parts *b b'* of each cam. A smooth-surfaced horizontal plate *g* is mounted by underhung eye-bearings *g'* and screwed by pinching-screws *g² g³* to the upper reciprocating rod *f'* of cross-head *f*, while a corresponding surfaced plate is mounted to bear over this and is formed in two parts *h h'*, screwed together and each slit at the center to slide on a fixed bar *h²*, set at an angle corresponding to that of tapered cop *e*; but if parallel-

shaped cops that are of equal diameter throughout are being wound this bar would be set parallel to longitudinal spindles.

A counterweighted bell-crank lever $i\ i'$ is 5 fulcrumed by an eye-boss loose on an adjustable spindle i^2 , carried on a bracket i^3 on side of frame A, and a strap connection j is taken from the arm of this lever $i\ i'$ to a movable spindle j' , having a vertical arm j^2 formed 10 with an eye and slit opening to act as a thread-guide, the thread passing previously round tension pins and eyes k on a bracket-plate k' on cross-head. The spindle j' is movable in eye-bearings j^3 , formed in a plate j^4 , screwed 15 to the top surface plate h' . A hand-operated spring-lever h^3 is used to engage with a projecting arm on spindle j' to hold the thread-guide in its inactive position when drawn back from the cop-spindle. The thread-guide arm 20 j^2 is mounted adjustably in an eye on end of spindle j' , so that it can be turned round and set at the angle to suit the angle of tapered cop. With this arrangement of mechanism 25 each paper cop e receives a uniform continuous motion of rotation from the spindle d , on which it is mounted, and at same time each cross-head f receives a uniform to-and-fro reciprocating movement from the cams $b\ b'$, so that the thread is wound on the cops in a series of diamond figures, the half of each being 30 in opposite diagonal directions. A pin h^5 is fitted in the horizontal surface plate h and works in a slot in the lower horizontal plate g , secured to cross-head, so as to give the top plate h and thread-guide a slight to-and-fro transverse movement to compensate for and agree with the taper on cop while the thread is being wound.

The spur-wheels have to be changed to suit 40 the thickness or variations of thread to be wound.

When this machine is constructed for winding parallel cops, the top surface plate $h\ h'$ is cast in one with cross-head and the lower 45 plate g and sliding motion dispensed with, and in this case only one cam $b\ b'$ is necessary to be mounted on the shaft a and the shaft a made a continuous longitudinal shaft throughout machine and driven through a 50 cross-head, such as f , with stud f^4 , carrying an antifriction-pulley, working in cam, so as to give a simultaneous to-and-fro reciprocating movement to all the thread-guides of machine. The vertical arm of thread-guide j^2 55 is in this case a fixture on movable spindle j' . The tension on the thread is regulated by automatically moving the longitudinal tension-rods $l\ l'$ so that the outer rod l shall pass through a semicircle or segment of a circle 60 from the time the winding of the pirn is started until fully wound, and the thread in passing round these rods to the plate k , carrying the tension-pins, has its tension automatically regulated.

65 The inner longitudinal rod l' is free to move in bearings in end brackets and has connected to it by cross-bars the outer longitu-

dinal parallel rod l . As shown in Figs. 6 to 8, a worm-wheel m is mounted by a boss loose 70 on the inner longitudinal rod l' , and a hand-lever m^2 is secured by its boss on this rod l' adjacent to the wheel m . The outer longitudinal rod l passes through an eye m^3 in this hand-lever m^2 , so that when the latter is moved round the rod l oscillates round with 75 it. A series of holes m' are formed round the flat surface of the worm-wheel m , and an adjusting-pin m^4 is passed through an eyehole in the hand-lever m^2 and through one of the 80 holes m' in worm-wheel, so that the hand-lever m^2 shall move with the wheel m through a semicircle or segment of a circle at each action of winding a pirn, the hand-lever m^2 being freed and the pin m^4 shifted back again 85 after the operation has been completed. This worm-wheel m is slowly actuated by a screw-worm n , formed on a spindle n' , carried in bearings in a bracket n^2 , projecting from machine-frame.

A ratchet-wheel n^3 is fitted on the worm- 90 spindle n' and receives its motion from a pawl o . This pawl o is mounted on a pin o' , carried on a lever o^2 , suspended from and free to move on a pin at the upper end of a bracket 95 o^3 . The reverse end of a similar lever p is mounted on a pin p' at the lower part of bracket o^3 , and both of these levers are formed with slots $o^4\ p^4$, Fig. 9.

A nut p^3 , formed with cylindrical internal-screw-threaded surface and of a rectangular 100 outer surface, is fitted in the slot p^4 of the lower link p , with a plane-surfaced head bearing up against bracket, and a pin p^2 , with screw-threaded surface, is fitted through loose bearings in slot o^4 of upper suspended link o^2 105 and screws into the internal-screw-threaded nut p^3 , so as to fix same in any adjusted position in the slots to give the pawl o a regulated motion to move over, say, one, two, or 110 three teeth of the ratchet-wheel n^3 at each action. The cross-head end q' of a connecting-rod q is attached to the upper end of the lower slotted link p , and the other end of the connecting-rod is attached to a projecting 115 stud q^2 , secured to the upper rod f' , which receives a to-and-fro motion from the cam $b\ b'$.

A series of ratchet-wheels would be kept in stock with different numbers of teeth on them to suit the class of work to be done.

Having now described my invention, what 120 I claim as new, and desire to secure by Letters Patent, is—

1. In machinery for winding thread, yarn and the like upon tapered cops, the combination of a fixed frame, a frame f and means 125 for reciprocating the latter, with a plate g mounted on and moving with said reciprocating frame, a plate $h\ h'$ carrying a thread-guide, and having a pin-and-slot connection with plate g , and a guide-bar h^2 on which the 130 plate $h\ h'$ is mounted, substantially as described.

2. In machinery for winding thread, yarn and the like, the combination of a frame, a

winding-spindle, a thread-guide and operating mechanism, with tension-rods, and means for automatically adjusting said tension-rods, as the winding proceeds, substantially as described.

5 3. In machinery for winding thread, yarn and the like, the combination of a frame, winding-spindle, reciprocating thread-guide and operating mechanism, with a pair of tension-rods and mechanism connecting a moving part of the machine with one of the said

rods, whereby the latter is automatically moved through a segment of a circle as the winding proceeds, as and for the purpose described.

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

BRYCE M. KNOX.

Witnesses:

R. C. THOMSON,

T. L. SCOULLER.

15