No. 646,410. Patented Apr. 3, 1900.

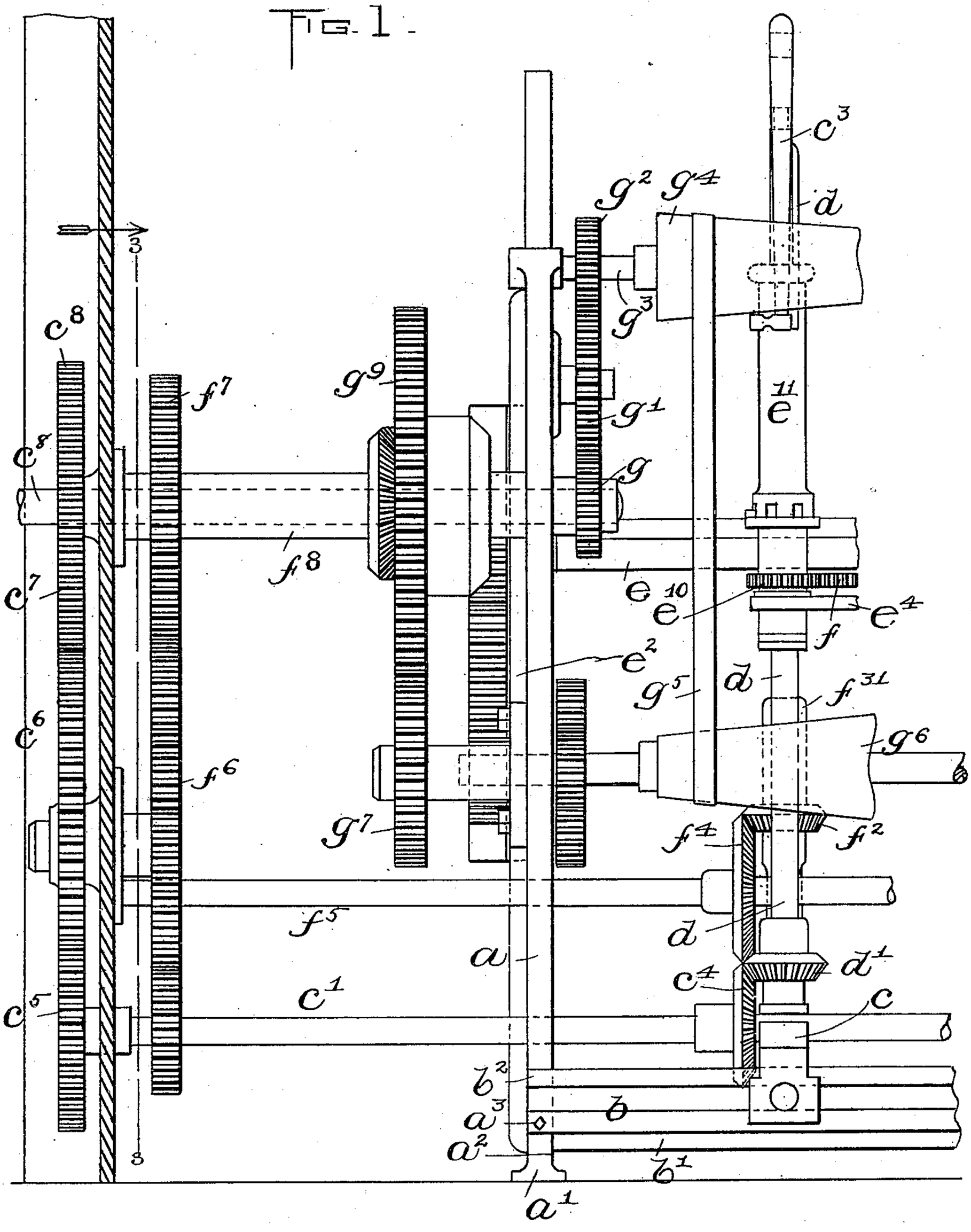
M. CAMPBELL.

ROVING MACHINE.

(Application filed Mar. 3, 1899.)

(No Model.) 5 Sheets—Sheet 1.

FIG. 1.



WITNESSES:
E. Batchelder
A. D. Harrison

INVENTOR:
Malcolm Campbell
by Wright, Brown & Quinby,
Attys.

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(No Model.) 5 Sheets—Sheet 2.

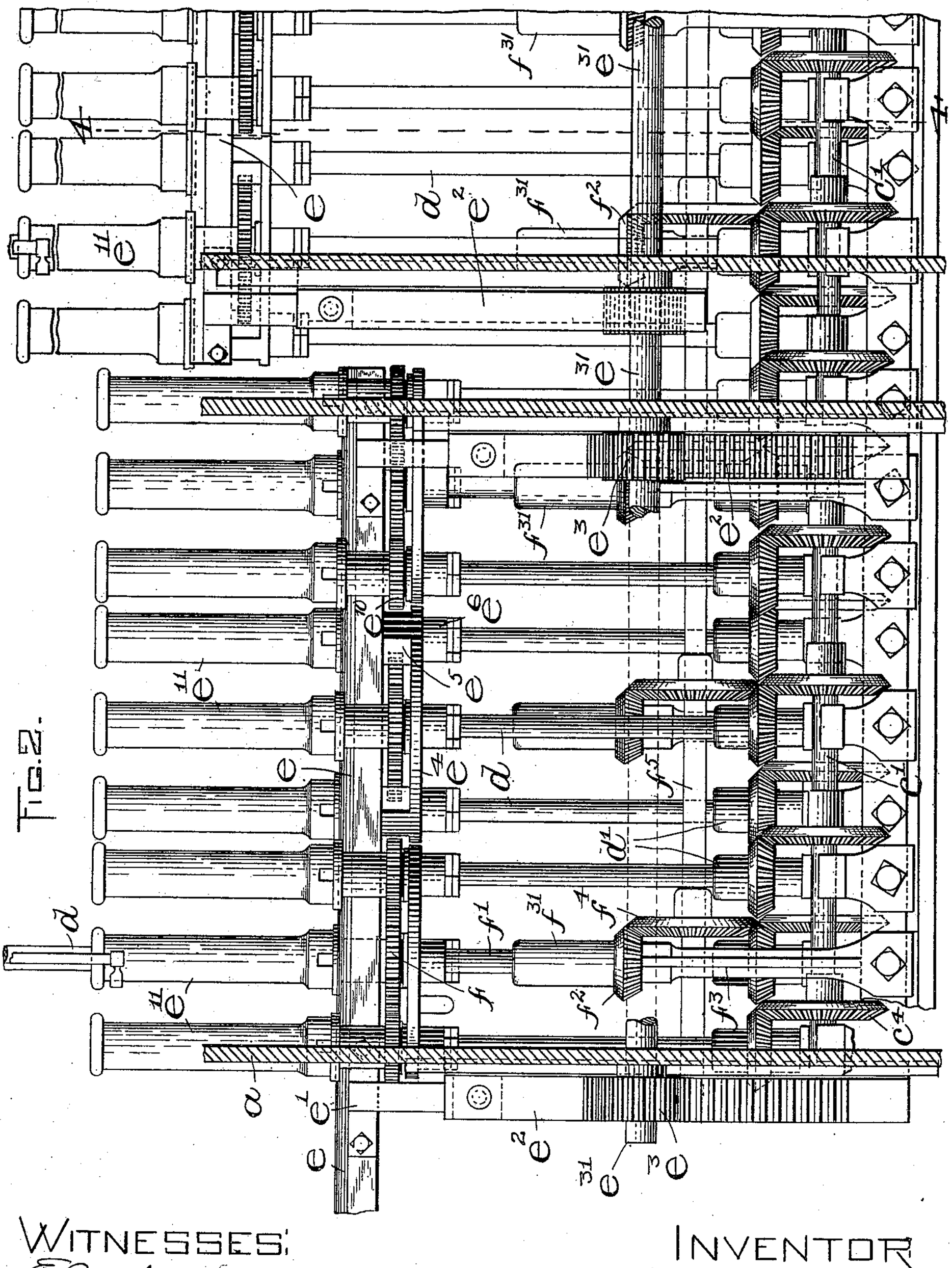

FIG. 2.

WITNESSES:
E. Batchelder
A. D. Harrison

INVENTOR
Malcolm Campbell
by Wright, Brown & Quinby
Attys.

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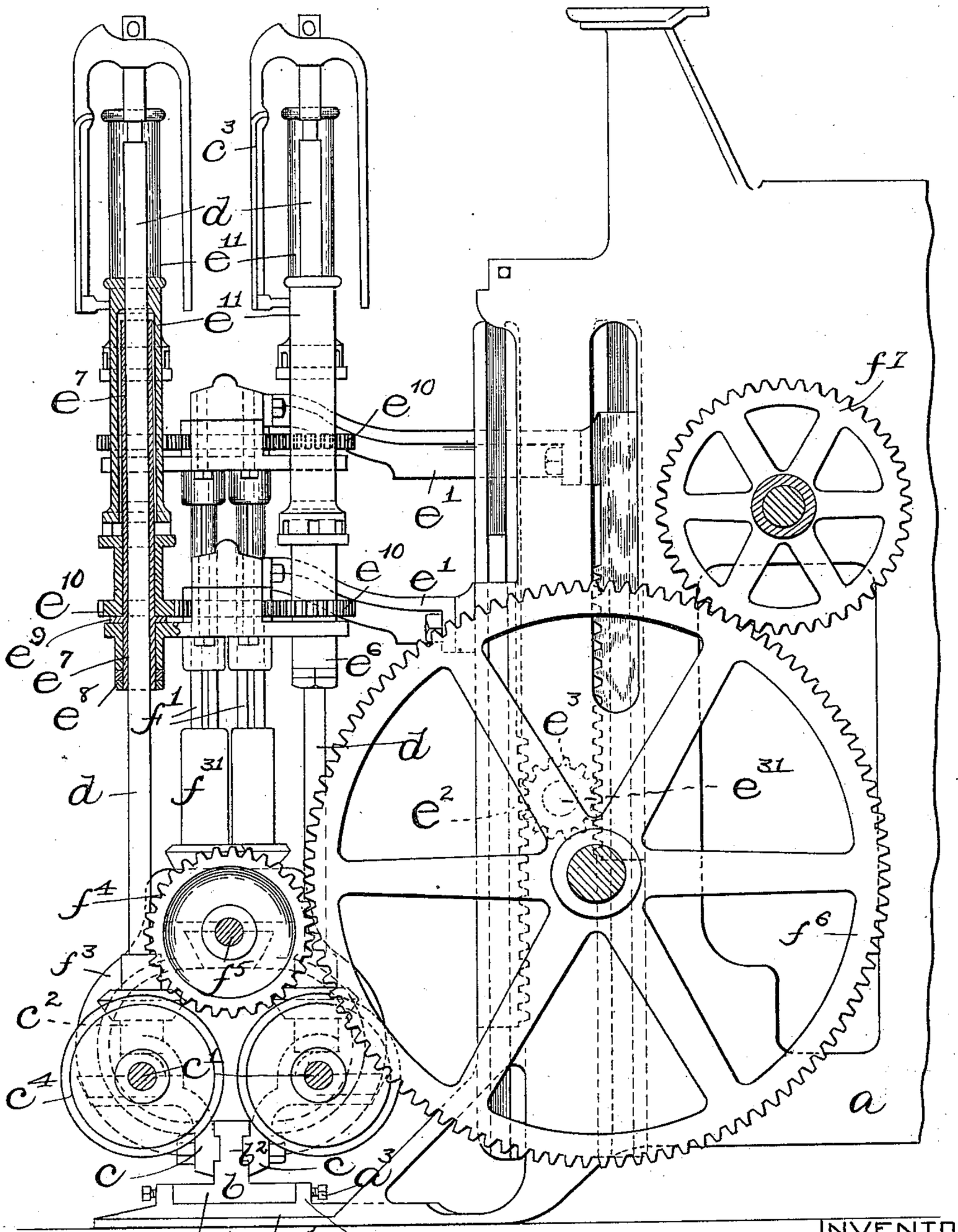
FIG. 3.



WITNESSES:
E Batchelder
A. D. Harrison

INVENTOR
Malcolm Campbell
by Wright, Brown & Quinby
Attys

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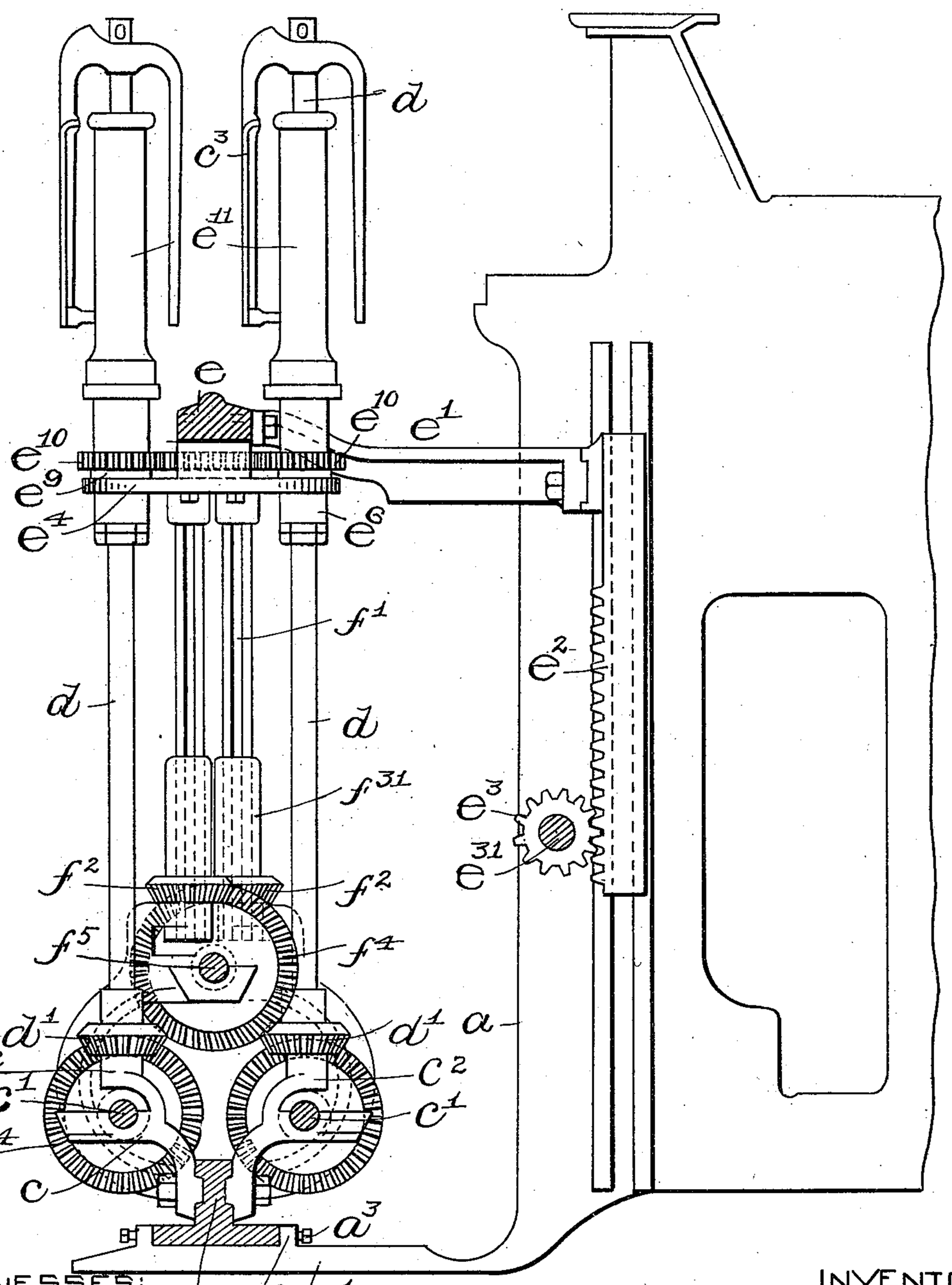
(No Model.) 5 Sheets—Sheet 4.

FIG. 4.



WITNESSES:
E. Batchelder
A. D. Harrison

INVENTOR
Malcolm Campbell
by Wright, Brown & Quinby
Atty's

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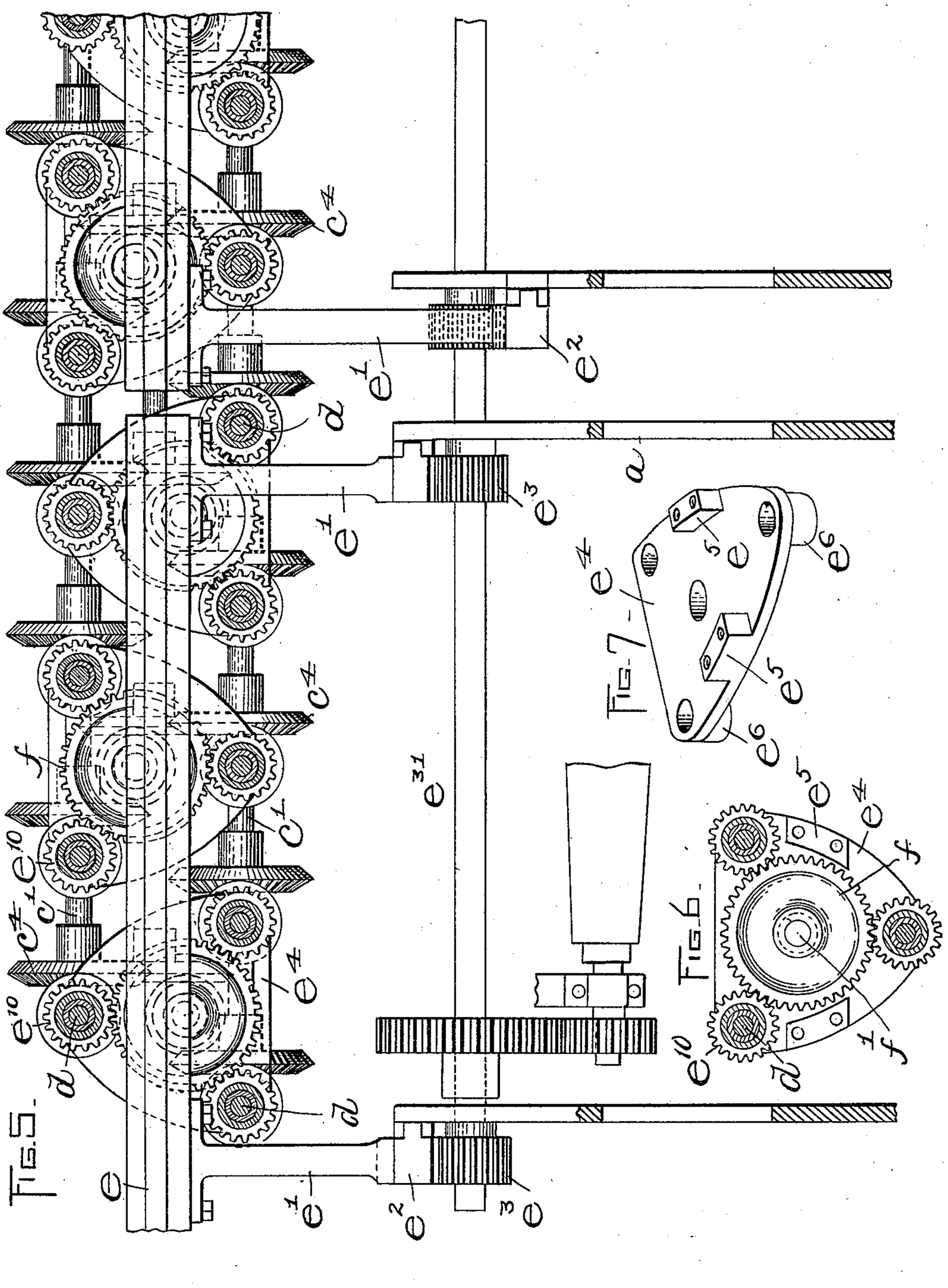

WITNESSES:
E. Batchelder
A. D. Harmon

INVENTOR:
Malcolm Campbell
by Wright, Brown & Quinby, Attys

UNITED STATES PATENT OFFICE.

MALCOLM CAMPBELL, OF BOSTON, MASSACHUSETTS.

ROVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 646,410, dated April 3, 1900.

Application filed March 3, 1899. Serial No. 707,625. (No model.)

To all whom it may concern:

Be it known that I, MALCOLM CAMPBELL, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Roving-Machines, of which the following is a specification.

This invention has relation to roving and similar machines; and it consists of certain novel features of construction and arrangement of parts, all as illustrated upon the drawings now to be described in detail and finally specified with particularity in the claims hereunto appended.

Reference is to be had to the accompanying drawings, and to the letters marked thereon, forming a part of this specification, the same letters designating the same parts or features, as the case may be, wherever they occur.

Of the drawings, Figure 1 represents in rear elevation the head end of a roving-machine embodying my invention. Fig. 2 represents in rear elevation and particularly in section the bolster-frame and the mechanism for rotating the bobbins and the fliers. Fig. 3 represents a section on the line 3 3 of Fig. 1, looking in the direction of the arrow, and shows the first samson in end elevation. Fig. 4 represents a section on the line 4 4 of Fig. 2 and shows the elevated portion of the bolster-frame. Fig. 5 represents a partial horizontal section through the machine and shows the two sections of the bolster-frame with the mechanism for reciprocating them in opposite directions. Fig. 6 represents in horizontal section a bolster-plate with the gearing supported thereon. Fig. 7 represents in perspective view a bolster-plate detached.

Heretofore it has been proposed or attempted to operate the bobbins and their fliers in roving or similar machines by mechanism arranged and constructed in at least two different ways—that is to say, it has been the practice to vertically reciprocate the shafting and gearing by which the bobbins were rotated or else to mount the shafting and gearing in stationary bearings and connect the vertically-reciprocated bobbins to the gearing by rotary vertically-stationary quills, on which the bobbins slid, but to which they were rotatively connected. Both of these constructions have proved to be faulty, the first because it required a strengthening of the machine-frame, and an increase in the weight of the base of the machine to compensate for the change in the center of gravity with the up-and-down movement of the gearing and shafting, besides in causing an increased expenditure of power to accomplish this last-mentioned movement, and the second because of the inability to provide a sufficient bearing for the spindle and bobbin, for in the said second construction the quill was supported in a bolster of but a few inches in length and was immovable vertically, whereby the bobbin and spindle and flier were liable to rotate unsteadily. By my invention the objections noted in connection with the previous constructions have been entirely overcome, for while preserving the desirable features of the second said construction—namely, the mounting upon a stationary support of the heavier shafting and gearing by which rotation is imparted to the bobbins—I have at the same time placed a portion of the gearing upon the vertically-moving bolster-rail and have been thereby enabled to provide elongated bolsters for the spindles and bobbins, whereby I prevent any unsteady rotation of the latter. I also achieve highly-desirable results by dividing the bolster-frame transversely into two independent sections and arrange the lifting-racks for the respective sections on either side of the shaft carrying the pinions, whereby one section counterbalances the other. In this way I dispense with the use of counterbalancing-weights, for as one section rises the other falls, and vice versa, and consequently the machine is not only less weighty and ponderous than heretofore, but also requires a less amount of power to operate it.

Referring to the drawings, *a* represents the framework of the machine, which is divided into samsons, the power being applied to gearing located at the head end. The said samsons are forwardly extended, as at *a'*, and are provided with lugs a^2, through which set-screws a^3 are passed to secure in place a step-rail *b*, having a base portion *b'* and an upwardly-extending portion b^2. To this rail by means of bolts are secured bearing-brackets

c c for two parallel shafts c' c', from which power is applied to the spindles, of which there are two rows. Each bracket is formed with a step c^2 to receive the lower end of a spindle d and support it. A bevel-gear d' is secured to the lower end of each spindle and intermeshes with and is driven by a bevel-gear c^4 on one of the shafts c' c', so that motion is conveyed to the spindles and to the fliers c^3. The shafts c' are rotated simultaneously by spur-gears c^5 on their ends, one of said gears being shown in Fig. 1, in which it is illustrated as receiving power from an intermediate gear c^6, in turn driven by a gear c^7, fast on the main shaft c^8. The last-mentioned gears are all mounted upon the outside of the first samson.

The bolster-rail e is mounted upon the ends of arms or brackets e', which are connected to vertical racks e^2, fitted to slide in guides on the sides of the samsons. These racks are driven by pinions e^3, fast on a shaft e^{31}.

The bolster-rail, the brackets, and the lifting-racks constitute what I term the "bolster-frame," and it will be seen by examining Fig. 2 that said frame is divided transversely into independent sections movable relatively to each other. The line of division is so located that the two sections are substantially equal in weight, whereby one is capable of counterbalancing the other. The racks for the section at the head end of the machine are arranged in the rear (looking from the front) of the shaft e^{31} and of the pinions e^3, while those for the other section are in front of them, and hence when the shaft is rotated first in one direction and then in the other the two sections are respectively raised and lowered alternately, as will be readily understood.

To the under side of the bolster-rail are attached triangular plates e^4, having upwardly-projecting lugs e^5, through which the securing-bolts are passed. These plates are arranged as shown in Fig. 4, and each one has at each of its corners a depending bearing sleeve or flange e^6 to receive the spindles d. The spindles, as previously stated, are arranged in two rows, and each spindle of one row is opposite a point midway between two spindles of the other row, so that three spindles are mounted in each plate e^4. In the bearing-sleeves of each plate are placed elongated bolsters e^7, the lower end of each of which is threaded to receive locking-nuts e^8, which secure it rigidly to the bolster-plate. Each bolster is flanged at e^9 to rest upon the plate and to furnish a support for a bobbin-gear e^{10}, which is mounted to turn thereon. The bobbins e^{11} rest upon the bobbin-gears and are hollowed out to receive the bolsters, which extend practically to the upper ends thereof.

The bobbin-gears of each group of three are equidistant, and arranged to intermesh therewith is a gear-wheel f, having its hub resting upon the bolster-plate. Each gear-wheel f is secured to a grooved shaft f', which projects downward through a bevel-gear f^2, having one part of its hub journaled in a curved bracket f^3, attached to the step-rail, and the other half of its hub elongated, as at f^{31}. There is a key which connects each shaft f' to its gear f^2, so that they are rotatively connected, while the shaft is free to rise and fall relatively thereto. The shafts f' are staggered relatively to the bolster-rail, as shown in Fig. 4, this being rendered necessary by the grouping of the bobbin-gears into threes. The bevel-gears f^2 all intermesh with and are driven by bevel-gears f^4 on a centrally-arranged shaft f^5, journaled in the brackets f^3, and to which power is applied from an intermediate gear or idler f^6, in turn rotated by a gear f^7 on the sleeve f^8, loose on the shaft c^8. Power is transmitted to the sleeve f^8 from the main shaft c^8 through the gear g, fast on the said shaft, the idler q', the gear g^2, fast upon the shaft g^3, the cone g^4 on said shaft g^3, the belt g^5, the cone g^6, the gear g^7, fast upon the lower cone-shaft g^8, and the spur-gear g^9, (forming a part of any suitable differential motion,) which is secured to the said sleeve f^8. These last-described parts for transferring power from the main shaft to the bobbin-shaft form no part of the present invention, however, and may be varied as circumstances require. Thus it will be seen that although the spindles are driven in the ordinary manner by two horizontal shafts the bobbins are rotated by a single horizontal shaft, which is vertically stationary and is supported upon immovable bearings. The bobbins being arranged in groups of threes permit of those of each group being driven by a single vertical shaft rotated by the horizontal shaft. In this connection I desire to state that I use the term "single shaft" in contradistinction to two or more shafts which are arranged side by side, and I mean to include thereby a shaft divided into sections, as where sections of a shaft are used for driving successive series of groups of bobbin-gears or where one section is used for each counterbalanced part of the frame. It is not essential that the vertical shafts should rise and fall with the bolster-rail, as they may be feathered into the gear f, which rotates the bobbin-gears, and remain stationary while the said gears f slide thereon. In any event, however, the arrangement of gearing by means of which the bobbin-gears of each group are rotated by a gear carried by the bolster-rail provides for the employment of an elongated bolster, on which the bobbins and spindles are journaled without the intervention of quills, and consequently the said bobbins and spindles are properly journaled and supported and are prevented from rotating unevenly and "chattering."

The bobbin-driving mechanism may be described as divided into three parts and comprising the horizontal shaft mounted on

brackets in the base of the machine, the gears directly engaging and driving the bobbin-gears and mounted on the vertically-moving bolster rail or support, and the vertically-arranged shafts for imparting power from the horizontal shaft to the gearing on the bolster-rail.

From the foregoing description it will be apparent to those familiar with the art to which this invention relates that the machine requires a less amount of power to operate it than has heretofore been necessary. Not only is the heavy gearing, including all the horizontal shafts, mounted in stationary bearings, but the traveling frame, on which they have heretofore been mounted, is formed in two counterbalancing-sections which are raised and lowered alternately with a minimum expenditure of power. By mounting the horizontal spindle-driving and bobbin-driving shafts in stationary bearings under the traveling frame it is not necessary to divide them and employ separate devices for operating the several portions thereof, as would be the case were the said shafts supported on the two separated sections of the said frame.

Having thus explained the nature of the invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, I declare that what I claim is—

1. A machine of the character specified, comprising a plurality of spindles arranged in two parallel rows; a plurality of bobbin-gears arranged in similar rows; a frame divided into sections which counterbalance each other, said sections carrying said rows of bobbin-gears; a single horizontal shaft mounted in stationary bearings below said frame, for driving the bobbin-gears of both rows, and two horizontal shafts mounted in stationary bearings below said frame, one for driving the spindles of each row.

2. A machine of the character specified comprising a traveling frame divided into sections which counterbalance each other; bobbin-gears supported by said frame in two parallel rows; a single horizontal shaft mounted in stationary bearings below said frame; and vertical shafts driven by said horizontal shaft for imparting motion to said bobbin-gears in both rows.

3. A machine of the character specified comprising a traveling frame, a plurality of spindles journaled in said frame; a plurality of bobbin-gears carried by said frame in two rows; horizontal shafts mounted in stationary bearings for driving said spindles; and a single horizontal shaft mounted in stationary bearings below said frame, for driving said bobbin-gears, whereby said frame is relieved of the weight of the said horizontal bobbin-gear-driving shaft.

4. A machine of the character specified comprising a traveling frame; a plurality of bobbin-gears arranged in two rows on said frame; a plurality of vertical shafts for driving said bobbin-gears; a single horizontal shaft mounted in stationary bearings below said frame; and gearing between said vertical shafts and said horizontal shaft.

5. A machine of the character specified comprising a traveling frame; a plurality of spindles arranged in two rows; a plurality of bobbin-gears concentric with said spindles and carried by said frame; a single horizontal shaft mounted in stationary bearings below said frame for driving all the bobbin-gears in the said rows; and a shaft mounted in stationary bearings below said frame for driving the spindles in each row.

6. A machine of the character specified comprising a series of spindles arranged in two parallel rows; bobbin-gears loose on the spindles and arranged in detached groups of threes; a vertically-reciprocatory frame for the bobbin-gears; a gear on said frame directly engaging and driving all the bobbin-gears of each group; vertically-arranged shafts for imparting motion to the second said gears; and a single horizontal shaft mounted in stationary bearings for rotating all the vertical shafts.

7. A machine of the character specified, comprising a series of spindles arranged in two rows; bobbin-gears loose on the spindles and arranged in groups of threes; a vertically-reciprocatory frame for the bobbin-gears; a gear on said frame directly engaging and driving all the bobbin-gears of each group; a vertically-arranged shaft for imparting motion to each of the second said gears; a single horizontal shaft mounted in stationary bearings and bevel-gearing between said horizontal shaft and said vertical shafts.

8. A machine of the character specified, comprising a vertically-reciprocatory bolster-rail; a series of bolsters arranged in two parallel rows supported by said rail; bobbin-gears on said bolsters; and mechanism for rotating said bobbin-gears, including gearing on the bolster-rail, a single horizontal shaft mounted in stationary bearings below the said rail, and operative sliding connections between the said gearing and the said shaft.

9. A machine of the character specified, comprising a series of spindles; stationarily-mounted gearing for driving said spindles, a vertically-reciprocatory bolster-rail; a series of bolsters supported by said rail; bobbins and bobbin-gears on said bolsters; a horizontal shaft mounted stationarily below the bolster-rail; and vertical shafts carried by and movable with said bolster-rail, said vertical shafts being driven by the horizontal shaft for imparting power to the bobbin-gears.

10. A machine of the character specified, comprising a plurality of spindles; stationarily-mounted gearing for driving said spindles; a vertically-reciprocatory bolster-rail; a series of bolsters supported thereby and arranged in two parallel rows; bobbin-gears on said bolsters; a single horizontal shaft mount-

ed stationarily below the bolster-rail; and gearing for imparting movement from said shaft to said gears.

11. A machine of the character specified, comprising a vertically-reciprocatory bolster-rail; a series of bolsters supported thereby and arranged in two rows; a series of bobbin-gears on said bolsters; a series of gears each supported by said rail and meshing with a bobbin-gear in each row; and a horizontally-arranged shaft mounted in stationary bearings and operatively connected with and driving the second said gears.

12. A machine of the character specified, comprising a vertically-reciprocatory bolster-rail; a series of bolsters supported thereby and arranged in two rows; a series of bobbin-gears on said bolsters; a series of gears each supported by said rail and meshing with a bobbin-gear in one row and two bobbin-gears in the other row; a horizontally-arranged shaft stationarily mounted below the said rail; and a series of vertical shafts driven by the horizontal shaft and operatively connected to the second said gears to rotate them.

13. A machine of the character specified, comprising a vertically-reciprocatory bolster-rail; a series of bolsters arranged in two parallel rows; a series of bolster-plates each arranged to receive and support three bolsters; a series of bobbin-gears; a step-rail; a horizontal shaft supported upon the step-rail; a series of vertical shafts, one for each bolster-plate, driven by the horizontal shaft; and a gear on each vertical shaft for driving the bobbin-gears supported by the said plate and the bolsters thereon.

14. A machine of the character specified, comprising a vertically-reciprocatory bolster-rail; a plurality of bobbin-gears arranged thereon in two parallel rows; a plurality of gears on said bolster-rail for driving said bobbin-gears; a plurality of spindles; stationarily-mounted gearing for driving said spindles; and gearing for driving said gears, the last-mentioned gearing including a plurality of vertical shafts and a horizontal shaft for driving them, all mounted in stationary bearings.

In testimony whereof I have affixed my signature in presence of two witnesses.

MALCOLM CAMPBELL.

Witnesses:
MARCUS B. MAY,
A. D. HARRISON.