(No Model.) 2 Sheets—Sheet 1.

J. SHERMAN.

GEAR CUTTING MACHINE.

No. 464,233. Patented Dec. 1, 1891.

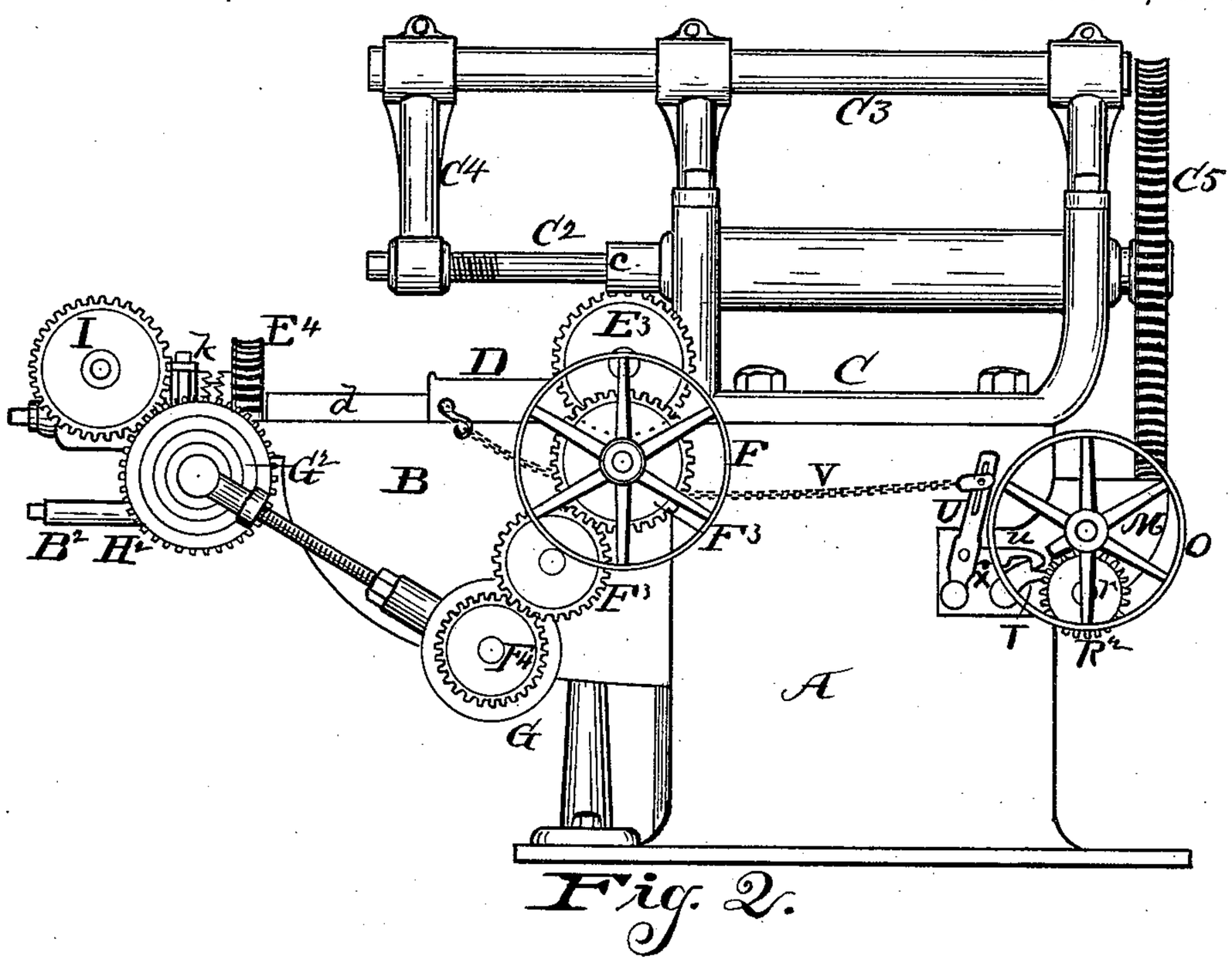

Fig. 2.

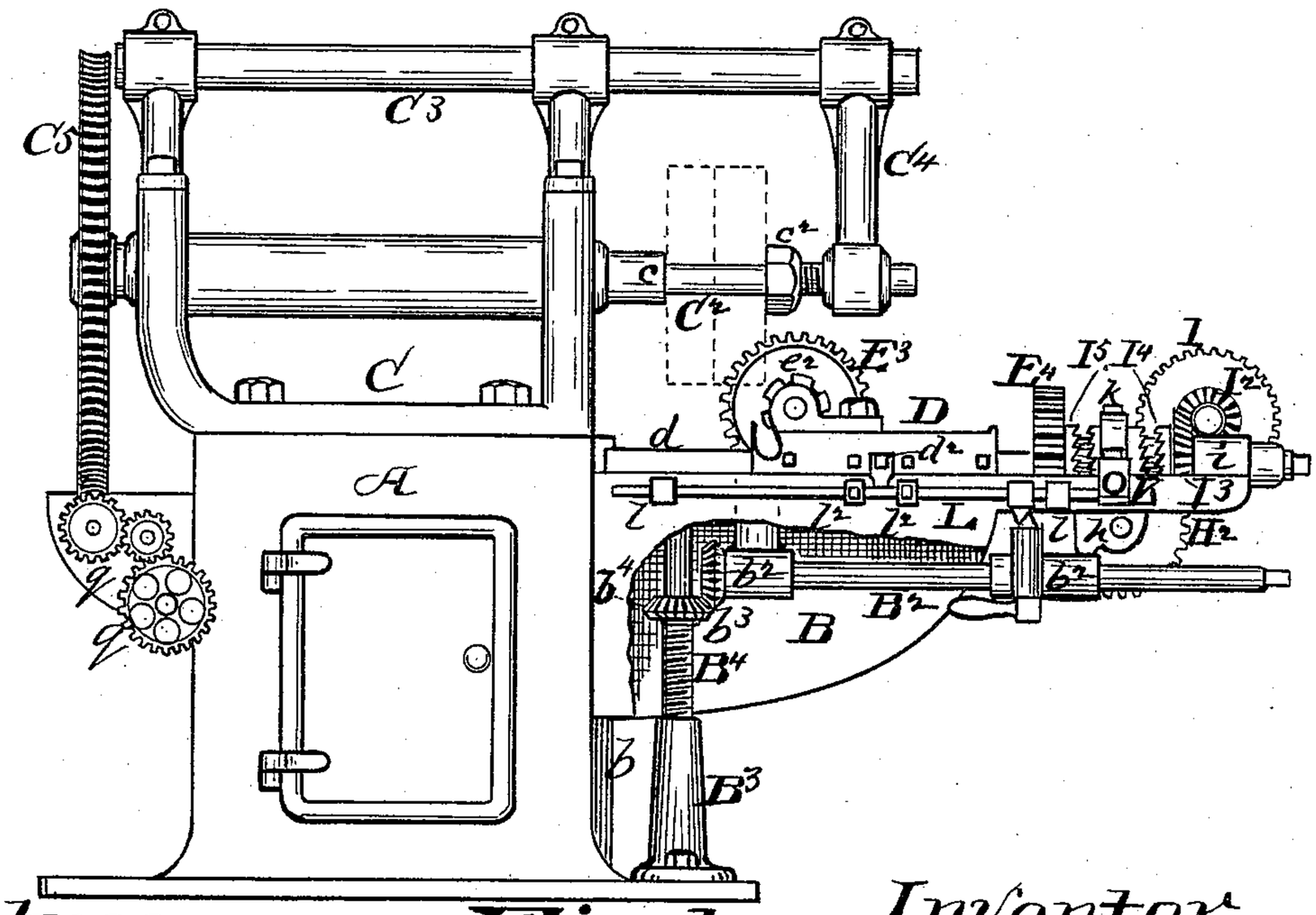

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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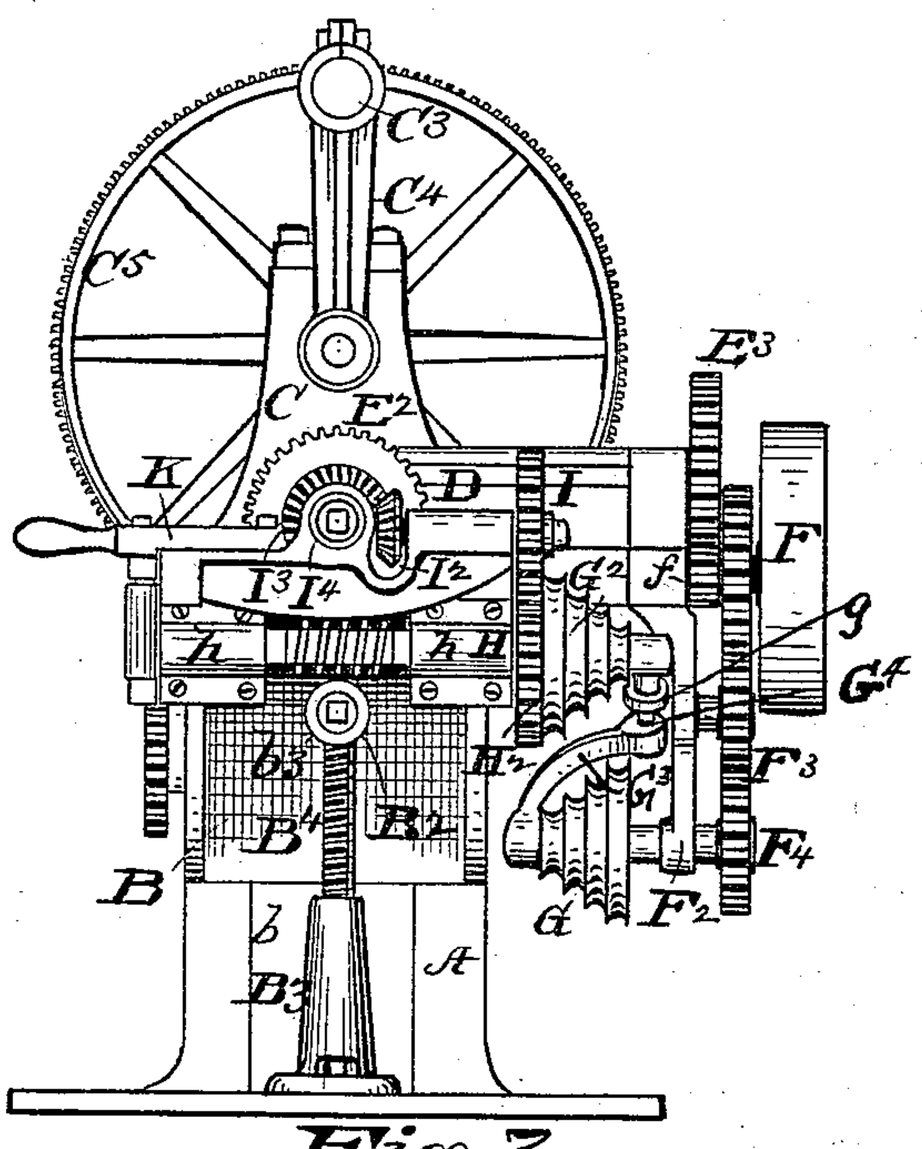

Fig. 3.

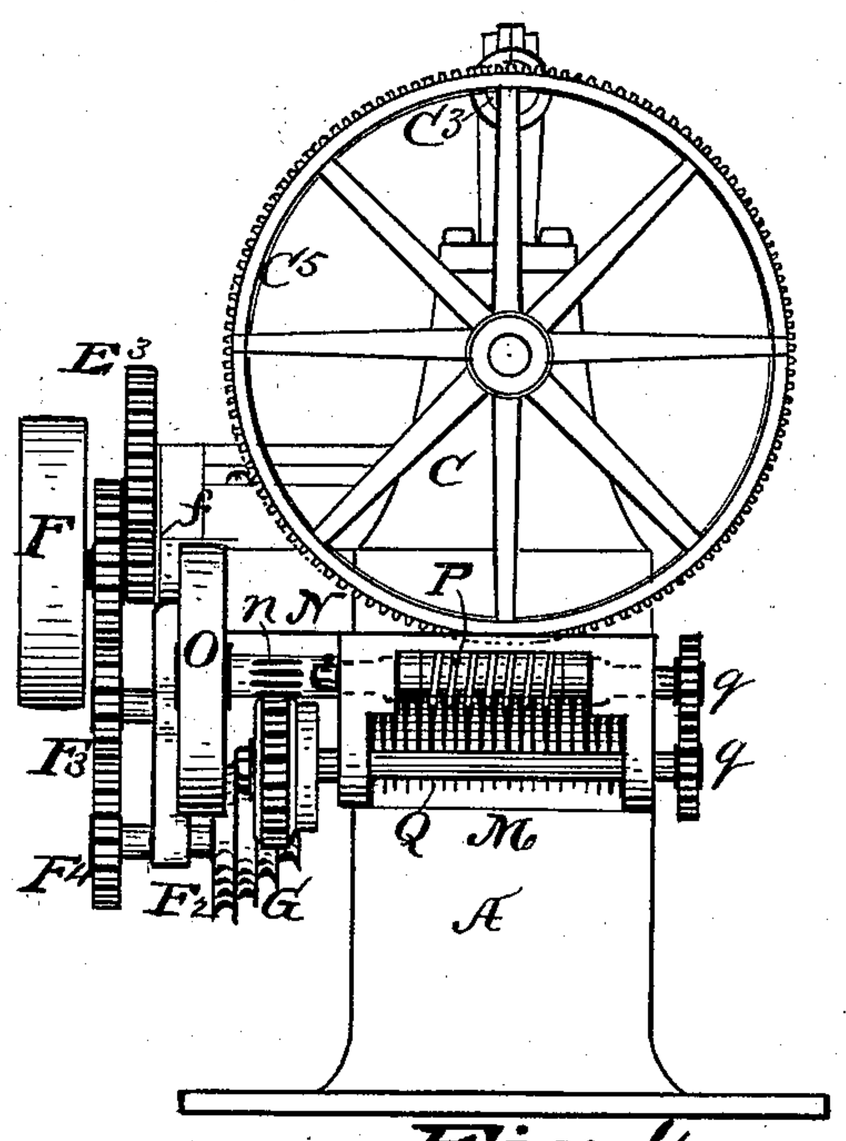

Fig. 4.

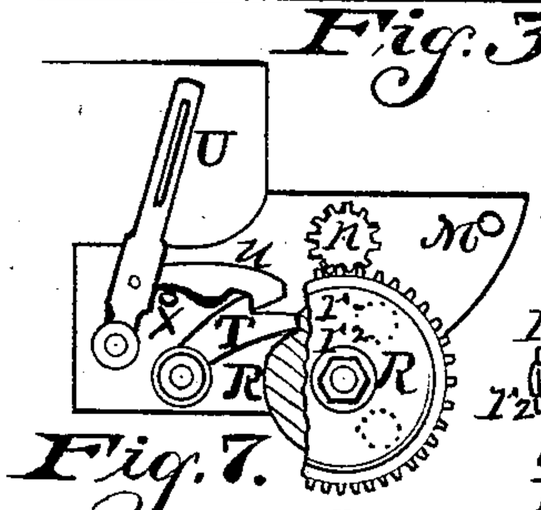

Fig. 7.

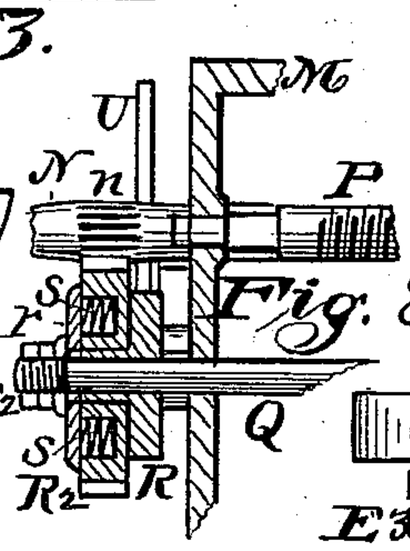

Fig. 8.

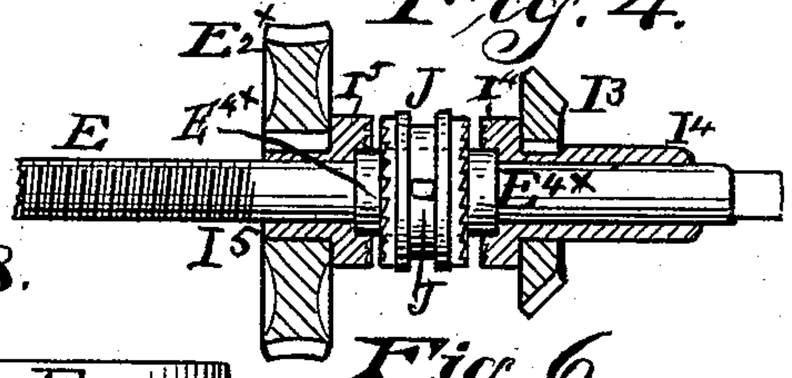

Fig. 6.

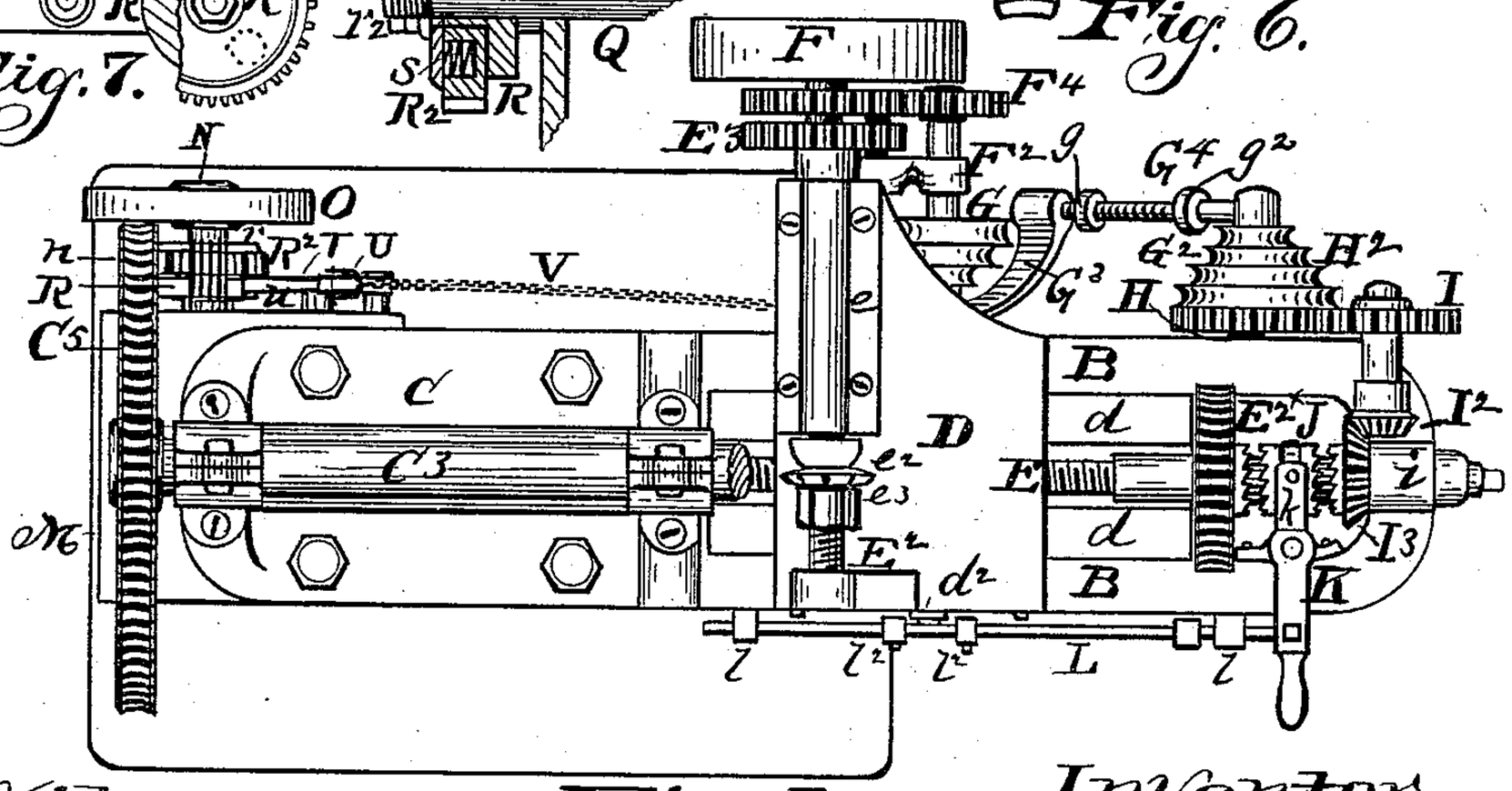

Fig. 5.

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UNITED STATES PATENT OFFICE.

JOHN SHERMAN, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO LOUIS SMITH, OF SAME PLACE.

GEAR-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 464,233, dated December 1, 1891.

Application filed July 13, 1891. Serial No. 399,296. (No model.)

To all whom it may concern:

Be it known that I, JOHN SHERMAN, a citizen of the United States, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Gear-Cutting Machines, of which the following is a specification.

This invention relates to machines for cutting gear-teeth; and it consists in the novel construction and combinations of parts, as hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a front side elevation. Fig. 2 is a reverse side elevation. Fig. 3 is a front end elevation. Fig. 4 is a rear end elevation. Fig. 5 is a top or plan view. Fig. 6 is a sectional view of the clutch. Fig. 7 is a side view of a latch-stop mechanism. Fig. 8 is a transverse sectional view of same.

A represents a standard and base, which supports all the working parts of the machine.

B is a vertically-adjustable table attached to one end of said standard by means of a dovetail groove and slide *b*. To the under side of the table is provided a horizontal shaft B^2, fixed to turn in hangers b^2, to the inner end of which is attached a bevel-gear b^3.

B^3 is a hollow internally-screw-threaded post secured to the base flange of support A, and B^4 is a vertical screw playing in said post, whose upper end is fixed in a socket in the under side of the table. It is also provided with a bevel-gear b^4, meshing with the aforesaid gear b^3. By means of a crank on the outer end of shaft B^2 the said table may be elevated or depressed for adjustment to accommodate it to the size of wheel being cut. To the top of the standard a frame C is attached provided with a work-holding shaft C^2, and above this is provided a parallel bar C^3, provided with a removable hanger C^4, employed for supporting the end of the shaft C^2, projecting over the table B. The said shaft C^2 is employed for holding the wheels to be cut, as shown in dotted lines in Fig. 1, the shaft having a shoulder *c*, against which the blank wheels rest and are held by a nut c^2 on the shaft. The rear end of the shaft C^2 is provided with a large worm gear-wheel C^5, referred to later on. Upon the table B is provided a sliding tool-holding bed D, having a dovetail groove riding on dovetail slides *d d* on said table. The bed D is made to travel back and forth by means of a screw E, playing in a nut on the under side of said bed D. On the bed D is provided a tool-holding shaft E^2, set in a suitable box-bearing *e*, the shaft having an arbor for holding the cutting-tool e^2 with a nut e^3. On the outer end of tool-shaft is provided a gear-wheel E^3. Beneath the tool-shaft is provided a second shaft (not visible) set in suitable bearings and having a pinion *f* meshing with said wheel E^3, and upon which is fixed the driving-pulley F. Upon the said invisible shaft is also suspended a swinging arm F^2, carrying a train of gear-wheels F^3 F^4. On the shaft of the lower gear is provided a cone-pulley G. Near the outer end of the table B is provided a shaft H, journaled in bearings *h h*, and it has a worm-screw, which turns the screw E through the medium of the worm-gear E^4 on said screw E, by which the traversing bed D is propelled. On the said shaft H is also placed a gear-wheel H′ and also a cone-pulley G^2, to be connected by belt with pulley G for transmitting motion thereto.

G^3 is a quadrant-arm connected with the shaft of lower-cone pulley, and it is also connected by a screw-rod G^4 with the shaft of upper-cone pulley G^2. Said screw-rod is also provided with jam-nuts *g* g^2 for fastening the rod in the sockets on the shaft and quadrant, by which also adjustment may be made for giving proper tension to the belt on the cone pulleys. Upon the top corner of table B is also provided a short shaft having a gear I meshing with the gear H^2, and on its opposite end is provided a bevel pinion-gear I^2, which meshes with a bevel-gear I^3 on a screw I^4, Fig. 6, loosely placed on the outer end of screw-shaft E and within the bearing *i* on the end of the table B. The clutch mechanism on said shaft E comprises one of the novel features of my invention, described as follows: The said screw-shaft E has an enlargement $E^{4\times}$, Fig. 6, forming shoulders, against which sleeves 14 and 15 bear, having clutch-teeth, and upon said sleeves are keyed the gears

$E^{2\times}$ and the bevel-gear I^3. Upon the enlargement $E^{4\times}$ is placed a sliding clutch-sleeve J, secured by a pin *j* entering a slot in the shaft, which allows it to have short longitudinal movement while rotating with the shaft. A ring is fitted to the groove in the periphery of the sleeve J and is pivoted in the yoke *k* on the lever K, which lever is fulcrumed onto the table B. On the side of the traversing bed D is fixed a push pin or arm d^2, and on the side of the table B is attached a sliding rod L, set to slide in bearings *l l* on the side of the table. This rod is pivotally attached to the clutch-lever K for actuating the same, as hereinafter shown. On the rod L are fixed adjustable stops l^2 l^2, against which the arm d^2 strikes in the movements of the bed. On the rear end of the standard A is attached a bracket M, supporting a worm-screw mechanism for intermittently actuating the feed-wheel C^5, by means of which the blank wheel being cut is turned for cutting the teeth in succession. This comprises the second novel feature of my invention and is described as follows.

N is a shaft set in bearings in the bracket M, having pinion-teeth *n*, and is provided with driving-pulley O.

P is a worm-screw shaft, also having its bearings in the said bracket, and lies parallel with shaft N, with its worm-screw in mesh with the teeth of large feed-wheel C^5.

Q is a third shaft journaled below the shaft N, and is connected by gear *g g* with the worm-screw shaft P. On the other end of shaft Q is provided a friction-gear mechanism by which an intermittent movement is applied to the said feed-wheel C^5. R is a wheel upon said shaft Q, having a sleeve upon which is placed a gear-wheel R^2 loosely, so that it may turn thereon. In one face of said wheel R^2 are made recesses in which are placed springs *s s*, bearing against a disk *r* on the outer end of the shaft; held by jam-nuts r^2, by which also the tension of the springs may be regulated. In one side of the wheel R is made a notch, (seen in Fig. 7,) with which a pawl T engages to prevent the wheel and its shaft from turning.

U is a lever pivoted by the side of the pawl and provided with a hook *u*, engaging with a shoulder or lug on the pawl. The lever U is connected by a chain V with the traversing tool-bed D, by means of which, when the said tool-bed has moved back in its return movements, will pull on the lever U and lift the pawl out of the notch in the wheel R. Then the said wheel, being free to move, will be turned by the friction-bearing of the wheel R^2 against it, and thereby turn the shaft Q, and through it and the gears *q q* impart a motion to the worm-shaft, and thus move the feed-wheel C^5. A pin or lug X is provided on the side support, which as the lever U is pulled over causes the hook *u* to be raised, it having an incline on its under side, which rides on the said pin or lug for the purpose of raising it. This releases the hook from the pawl and lets it drop back again, so as to catch in the notch again and stop the revolution of the said wheel and shaft until the aforesaid tool-bed again makes its return movement, which will repeat this operation.

Having described my invention, I claim—

1. The combination, with screw E, having enlargement $E^{4\times}$, of loose clutch-sleeves I^4 I^5, worm-gear $E^{2\times}$, keyed onto said sleeve I^4, worm-screw shaft H, meshing with said gear $E^{2\times}$, and cone-pulley G^2 for giving rotary motion to said screw E, the cone-pulley G and the quadrant-arm connecting the shafts of the said pulleys, substantially as and for the purpose specified.

2. The combination of screw E, having enlargement $E^{4\times}$, loose clutch-sleeves I^4 I^5, gear $E^{2\times}$, and bevel-gear I^3, keyed onto said sleeves, clutch-sleeve J, mounted on said enlargement, and means for shifting said clutch-sleeve, worm-screw shaft H, and the connected cone-pulleys, gear H^2, gear and short shaft I, and bevel-pinion meshing with said bevel-gear I^3, arranged to operate in the manner and for the purpose specified.

3. The combination, with the feed-wheel C^5 and worm-screw shaft P, of shaft Q, each journaled in the bracket M and connected to revolve in conjunction by gears *q q*, wheel R, mounted on said shaft Q and having the friction gear-wheel R, mounted on the hub of said wheel R, said gear having recesses and springs *s s*, bearing-plate *r*, jam-nuts r^2, the shaft N, having gear-teeth *n* meshing with said friction-gear R^2, and pulley O, mounted on said shaft N, all arranged to operate substantially as and for the purpose specified.

4. The combination, with feed-wheel C^5 and worm-shaft P, of shaft Q, each journaled in the bracket M and connected to revolve in conjunction by gear *q q*, wheel R, mounted on shaft Q and having a notch, of the stop-pawl T, lever U, having hook *u*, and means for operating said lever, hook, and pawl, substantially as described, for releasing said wheel R, whereby intermittent revolving movements are imparted to said feed-wheel C^5 through the medium of the friction-gear R^2, substantially as and for the purpose specified.

JOHN SHERMAN.

Witnesses:
GEO. W. TIBBITTS,
LOUIS SMITH.