No. 840,528. PATENTED JAN. 8, 1907.

J. T. TOWSLEY.

DOUBLE BORING MACHINE.

APPLICATION FILED OCT. 24, 1906.

2 SHEETS—SHEET 1.

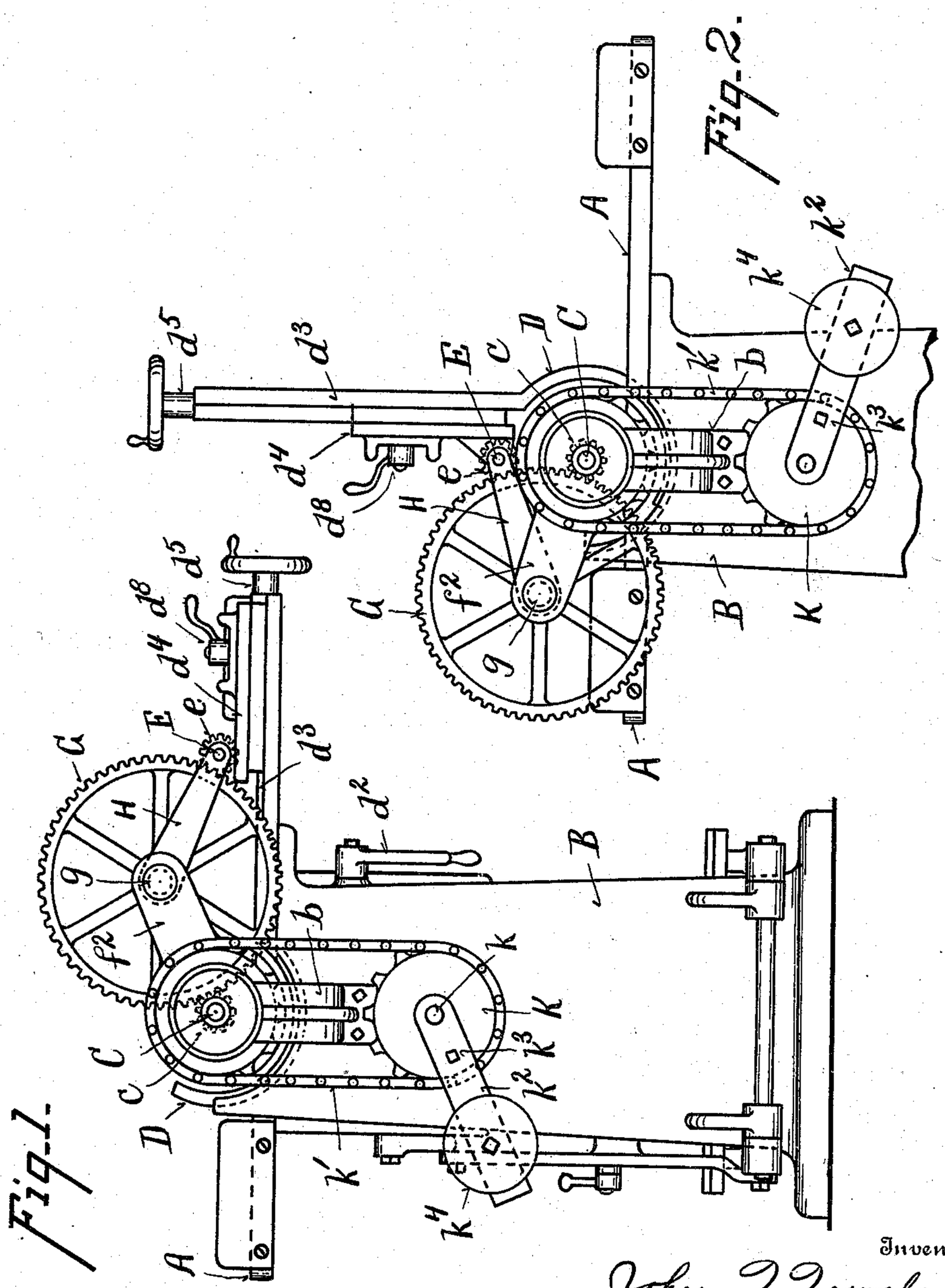

Fig. 1.

Fig. 2.

Witnesses
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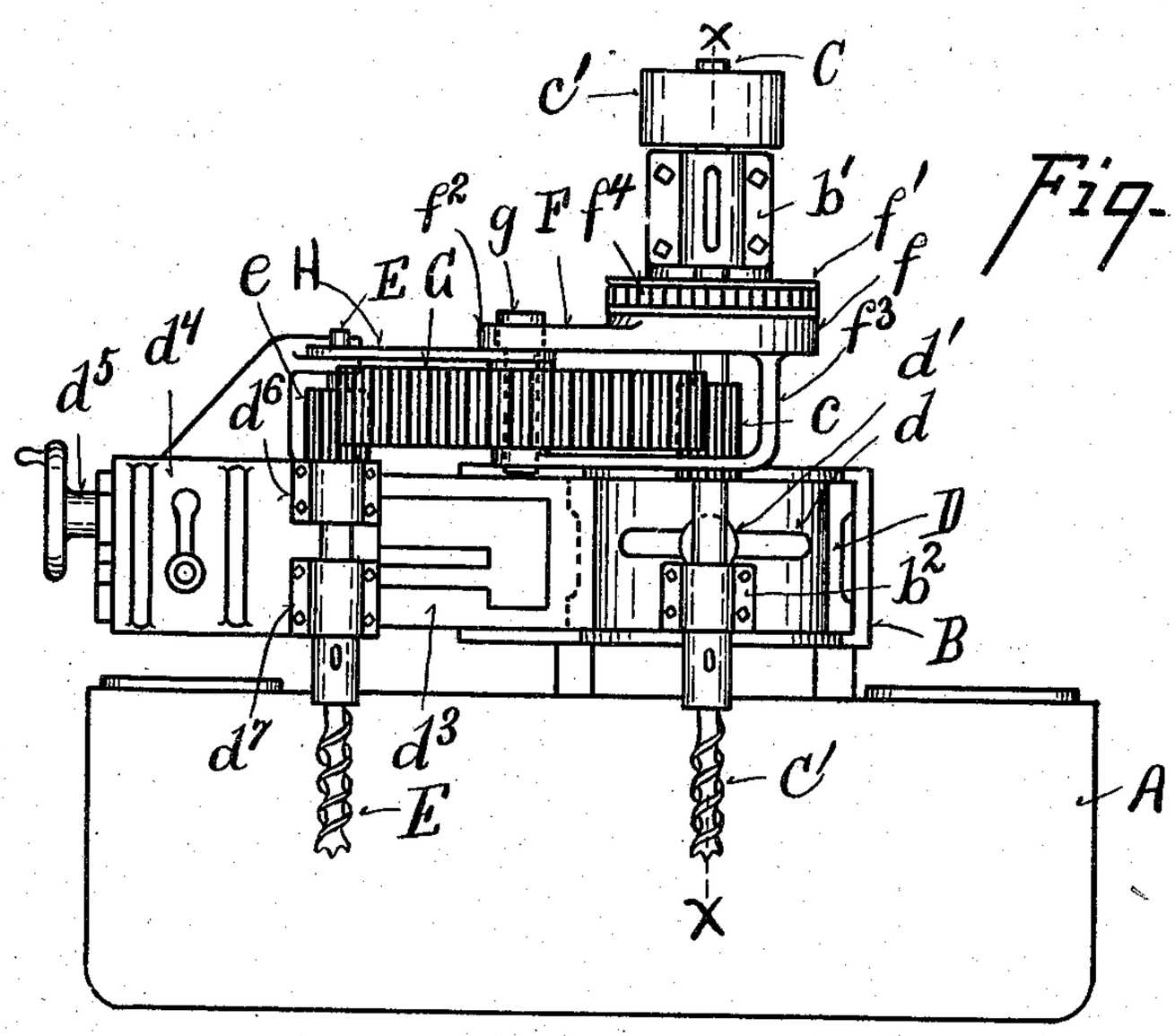

Fig. 3.

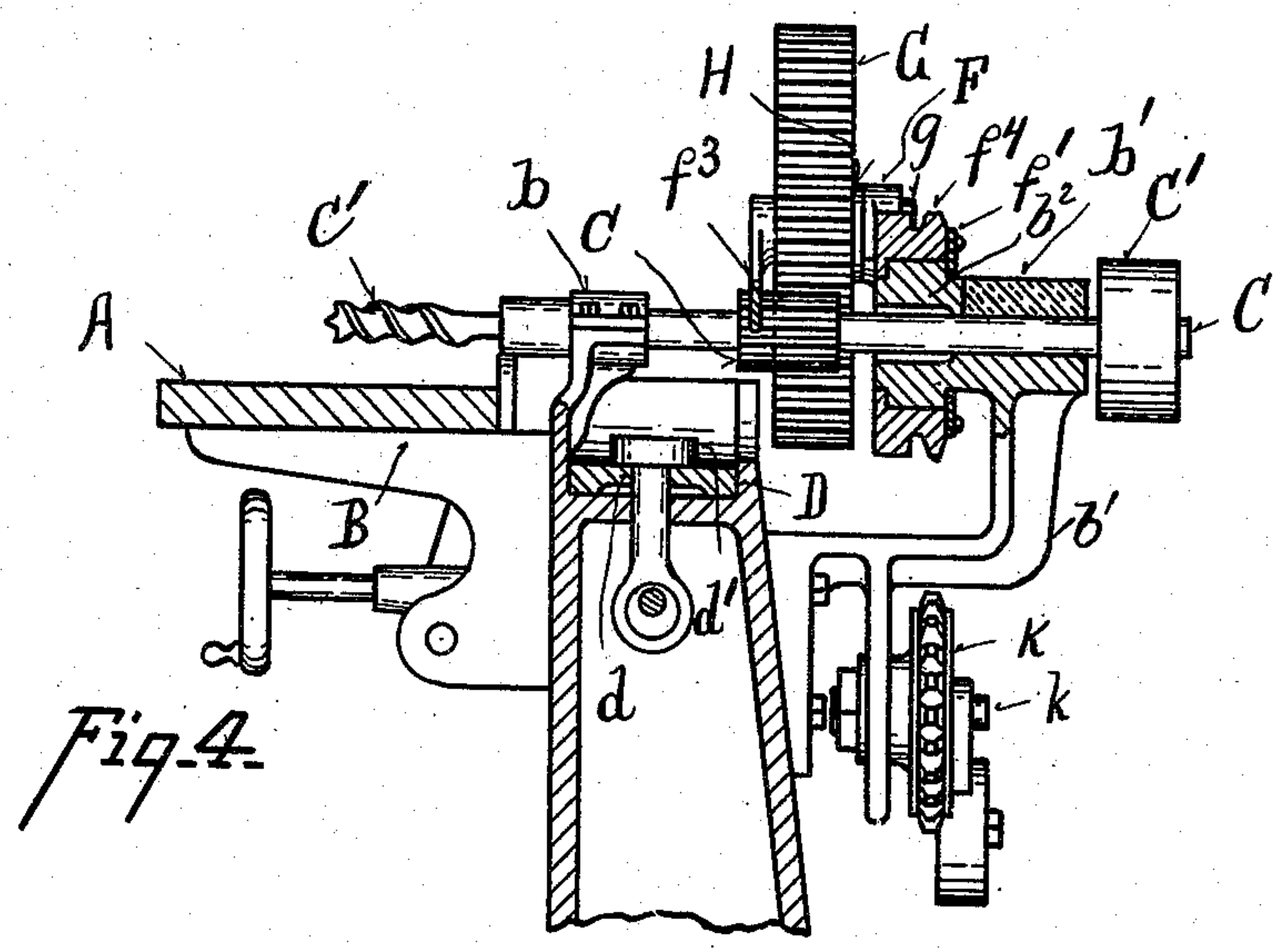

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN T. TOWSLEY, OF CINCINNATI, OHIO.

DOUBLE BORING-MACHINE.

No. 840,528. Specification of Letters Patent. Patented Jan. 8, 1907.

Application filed October 24, 1906. Serial No. 340,266.

To all whom it may concern:

Be it known that I, JOHN T. TOWSLEY, a citizen of the United States of America, and a resident of Cincinnati, county of Hamilton, State of Ohio, have invented certain new and useful Improvements in Double Boring-Machines, of which the following is a specification.

In boring-machines of the kind to which this invention relates the work is held upon a horizontal table. One of the boring-spindles is fixed, and the other boring-spindle is mounted so as to be rotatable about the fixed spindle and to be adjustable to different distances therefrom. The fixed spindle is directly driven. A large gear-wheel is mounted so as to change position with the movable boring-spindle to keep it in gear with the fixed spindle.

The object of my invention is to provide a means for automatically counterbalancing the pressure of the large gear-wheel against the movable boring-spindle in proportion as the pressure changes with different positions of these parts. This object is attained by the means illustrated in the accompanying drawings, in which—

Figure 1 is a rear elevation of a boring-machine embodying my invention, showing the saddle-bed in its horizontal position. Fig. 2 is a view similar to Fig. 1, but showing the saddle-bed in its vertical position, parts of the machine being broken away and omitted which have no particular bearing upon the present invention. Fig. 3 is a plan view of my invention. Fig. 4 is a sectional view on line $x\ x$ of Fig. 3.

Table A, upon which the work is held, is mounted upon column B, so as to be movable toward the boring-spindles in the customary manner. The fixed boring-spindle C is journaled in brackets b and b', which are secured, respectively, to the front and rear of the column B. The top of the column B has a semi-cylindrical depression, into which fits a semi-cylindrical segment D, which has a slot d, through which a bolt d' passes into the column to hold the segment D in the relative position to its seat in the column to which it has been adjusted, this locking being accomplished by means of lever d^2 in the usual manner. The fixed spindle C is located in the axis of the segment D. To the segment D is secured the saddle-bed d^3, upon which the saddle d^4 is movable by means of the feed-screw d^5, so as to move the saddle toward and away from the fixed spindle D. Saddle d^4 has journal-boxes d^6 and d^7, in which the movable boring-spindle E is journaled. When the saddle has been adjusted to the position desired, it is locked by means of the clamp d^8. Bracket b' has a collar b^2 concentric with the fixed spindle C, upon which is journaled a yoke F, which contains a cylindrical box f, fitting over the collar b^2 and held thereon by means of a ring f', secured to the box and projecting down over the inside of the collar. Box f has projecting from it a straight arm f^2 and an L-shaped arm f^3, between which a shaft g is journaled. Shaft g carries a large gear-wheel G, which meshes with gear-teeth e and c, cut, respectively, upon the movable and upon the fixed boring-spindles E and C. Upon shaft g is journaled an arm H, the opposite end of which is journaled upon the end of the boring-spindle E. The fixed spindle C carries a pulley c', which receives the driving-belt.

In the operation of this double boring-machine as thus far described it is seen that rotation is conveyed from the fixed spindle C through the large gear G to the movable spindle E. When it is desired to change the vertical distance of the movable spindle above the table A, this is accomplished by rotating the segment D in the top of the column, which carries the saddle-bed from a horizontal to vertical position or to any position between a horizontal and a vertical position. In moving the bed in this manner it is seen that the yoke F revolves about the bracket b', always keeping the large gear G in mesh with the teeth e and c. When the saddle is moved toward or from the fixed spindle to change the relative positions of the two boring-spindles, it is seen that the arm H likewise causes the yoke F to revolve the bracket b'.

It is seen that the weight of the large gear-wheel G has a tendency to force the boring-spindles apart and that this tendency increases with the distance apart of the boring-spindles and with the distance which the saddle-bed occupies from its vertical position. To counterbalance this varying pressure of the large gear-wheel G, I have provided the following mechanism:

Box f of the yoke has upon its exterior gear, teeth f^4. Beneath the box f I have mounted a sprocket-wheel K upon an adjustable stud k, which projects through bracket b. Connecting sprocket-wheel K and the gear-teeth

upon the box f is a sprocket-chain k'. Journaled upon the stud k is an arm k^2, which projects from the stud k in a direction diametrically opposite to that in which the arm f^2 projects. Arm k^2 is fastened by a bolt k^3 to the sprocket-wheel K and carries at its end a weight k^4. The weight k^4 creates a tendency in the sprocket-wheel K to rotate in a direction opposite to that in which the weight of the gear-wheel G tends to rotate the yoke. The length of the lever-arm of the weight k^4 is seen to be greatest when the arm f^2 approaches its horizontal position, which is the position in which the gear-wheel G has a tendency to exert greatest pressure upon the spindle E, and that as the arm f^2 approaches the vertical position the length of the lever-arm of the weight k^4 decreases, so that as the pressure of the gear-wheel G decreases the tendency of the weight to rotate the sprocket-wheel K decreases. When the arm f^2 passes beyond the vertical position, as shown in Fig. 2, it is seen that the tendency of the large gear-wheel G is no longer exerted toward forcing the spindles apart, but tends to draw them together, and that this tendency likewise is overcome by the weight k^4, which tends to move the yoke in a direction so as to separate the boring-spindles. The varying pressure of the gear-wheel G upon the spindle E is thus automatically counterbalanced.

What I claim is—

1. In a boring-machine the combination of boring-spindles mounted so as to be adjustable toward and away from each other, gear-teeth upon the spindles, a gear-wheel mounted so as to move with the spindles and to keep in mesh with the teeth thereon, and an automatic counterbalance for the weight of the gear-wheel against the spindles.

2. In a boring-machine the combination of a fixed boring-spindle, a boring-spindle mounted to revolve about the fixed spindle, teeth upon the spindles, a yoke revoluble about the fixed spindles, a gear-wheel carried by the yoke to mesh with the teeth upon the spindles, and a counterbalance connected to the yoke for the weight of the gear-wheel against the spindles.

3. In a boring-machine the combination of a fixed boring-spindle, a saddle-bed mounted to revolve about the fixed spindle, a saddle mounted reciprocally upon the bed, a spindle journaled in the saddle, teeth upon the spindles, a yoke mounted revolubly about the fixed spindle having outwardly-projecting arms, a gear-wheel journaled between the arms of the yoke and in mesh with the teeth upon the spindles, an arm pivoted at one of its ends to the yoke and at the other of its ends to the saddle, and a counterbalance carried by the yoke for the weight of the gear-wheel against the spindles.

4. In a boring-machine the combination of a fixed boring-spindle, a saddle-bed mounted to revolve about the fixed spindle, a saddle mounted reciprocally upon the bed, a spindle journaled in the saddle, teeth upon the spindles, a yoke mounted revolubly about the fixed spindle having outwardly-projecting arms, a gear-wheel journaled between the arms of the yoke and in mesh with the teeth upon the spindles, an arm pivoted at one of its ends to the yoke and at the other of its ends to the saddle, gear-teeth upon the yoke, a sprocket-wheel mounted adjacent to the yoke, a chain connecting the yoke and the sprocket-wheel, an arm secured to the sprocket-wheel and a weight carried by the arm to counterbalance the weight of the gear-wheel upon the spindles.

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