

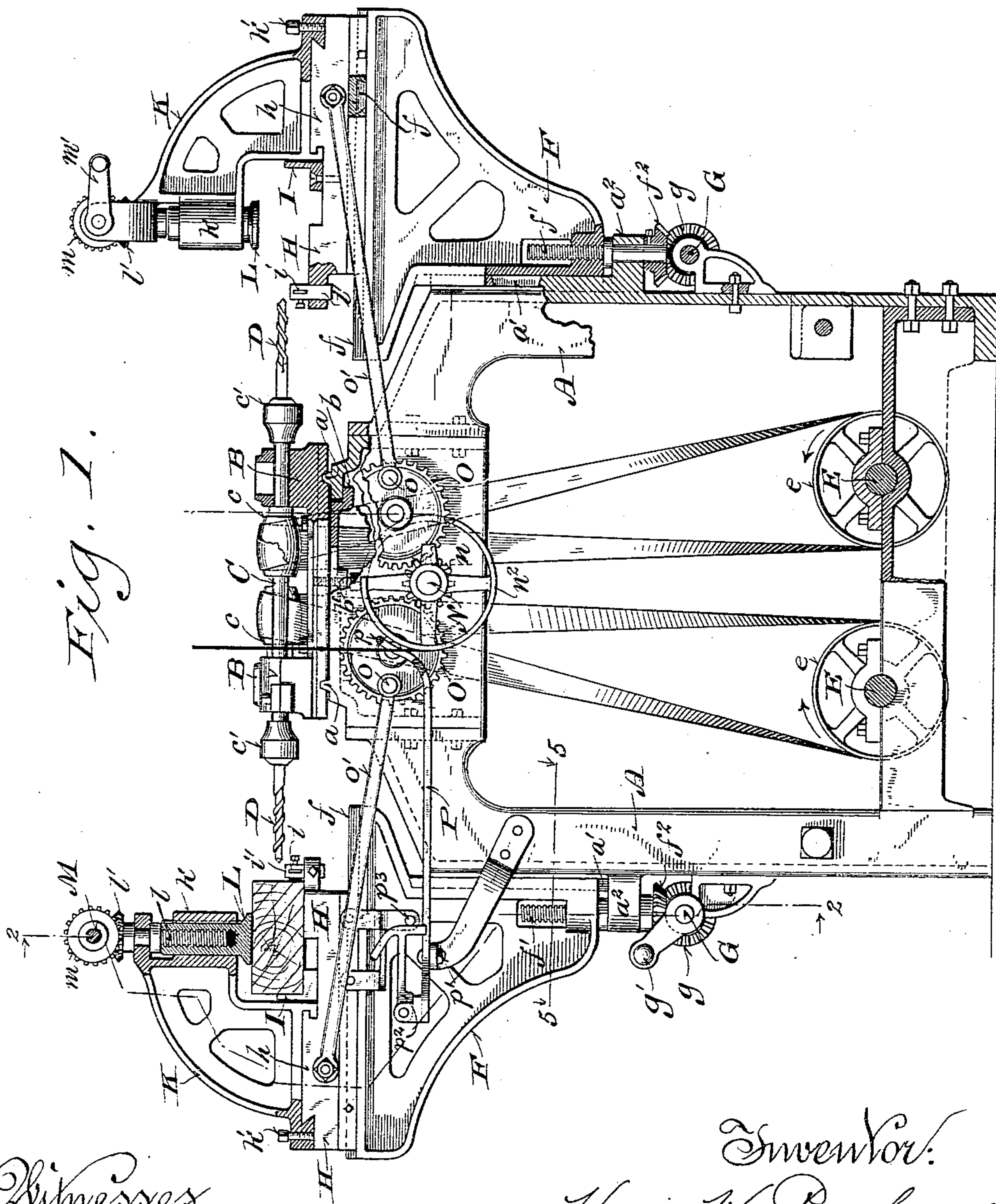
(No Model.)

3 Sheets—Sheet 1.


H. H. ROCKWELL.
GANG BORING MACHINE.

No. 560,234.

Patented May 19, 1896.



Witnesses.
Geo W. Young.
Chas. L. Cross


 Given for:
 Henry N. Rockwell,
 By Wm. H. Bonden Smith & others Libr.

Attorneys.

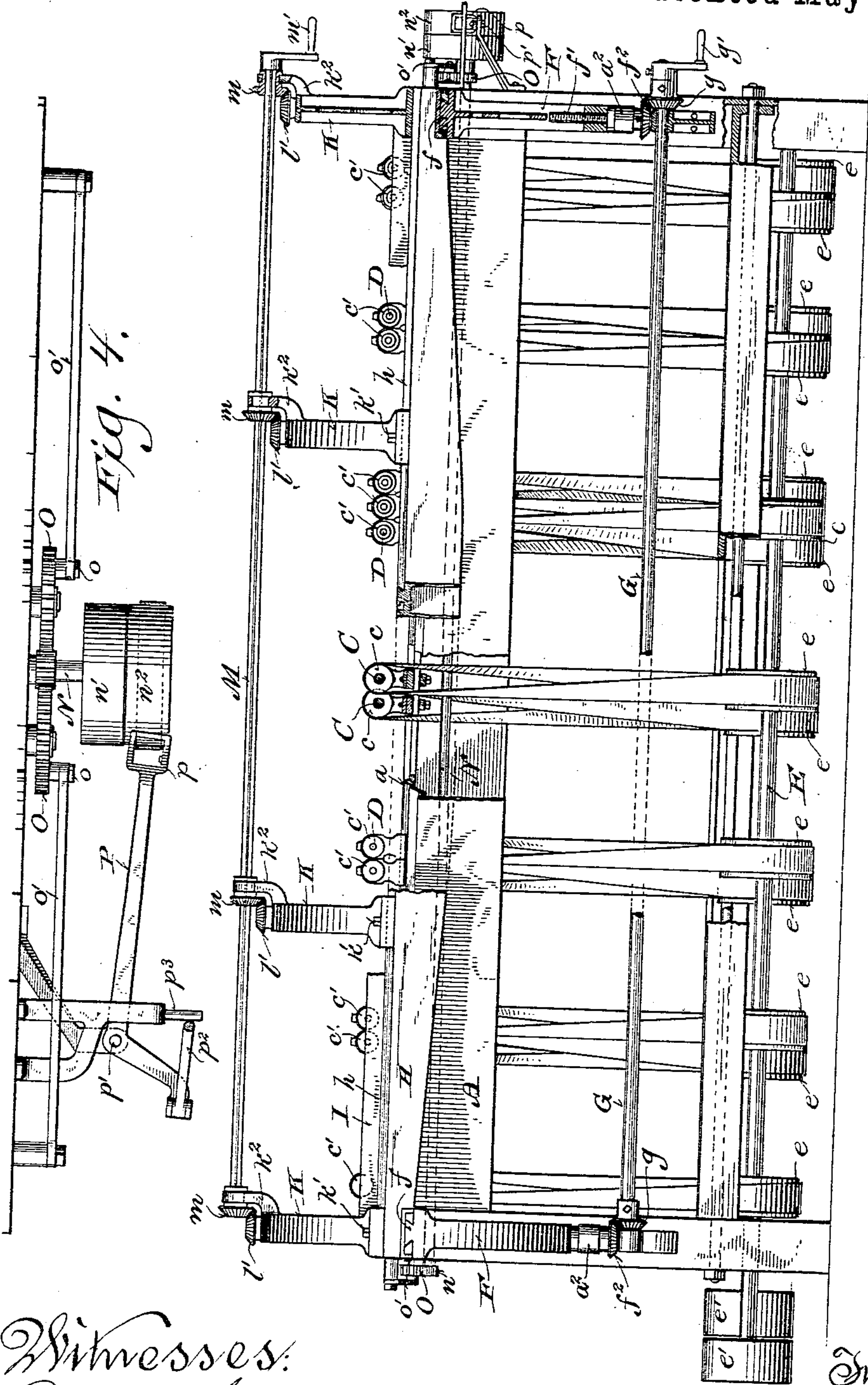
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3 Sheets—Sheet 2.

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No. 560,234.

Patented May 19, 1896.



Witnesses:
Geo. W. Young.
Chas. L. Good.

Inventor:
Henry H. Rockwell,
By Muller, Henders Smith & Pottum, Attorneys

(No Model.)

3 Sheets—Sheet 3.

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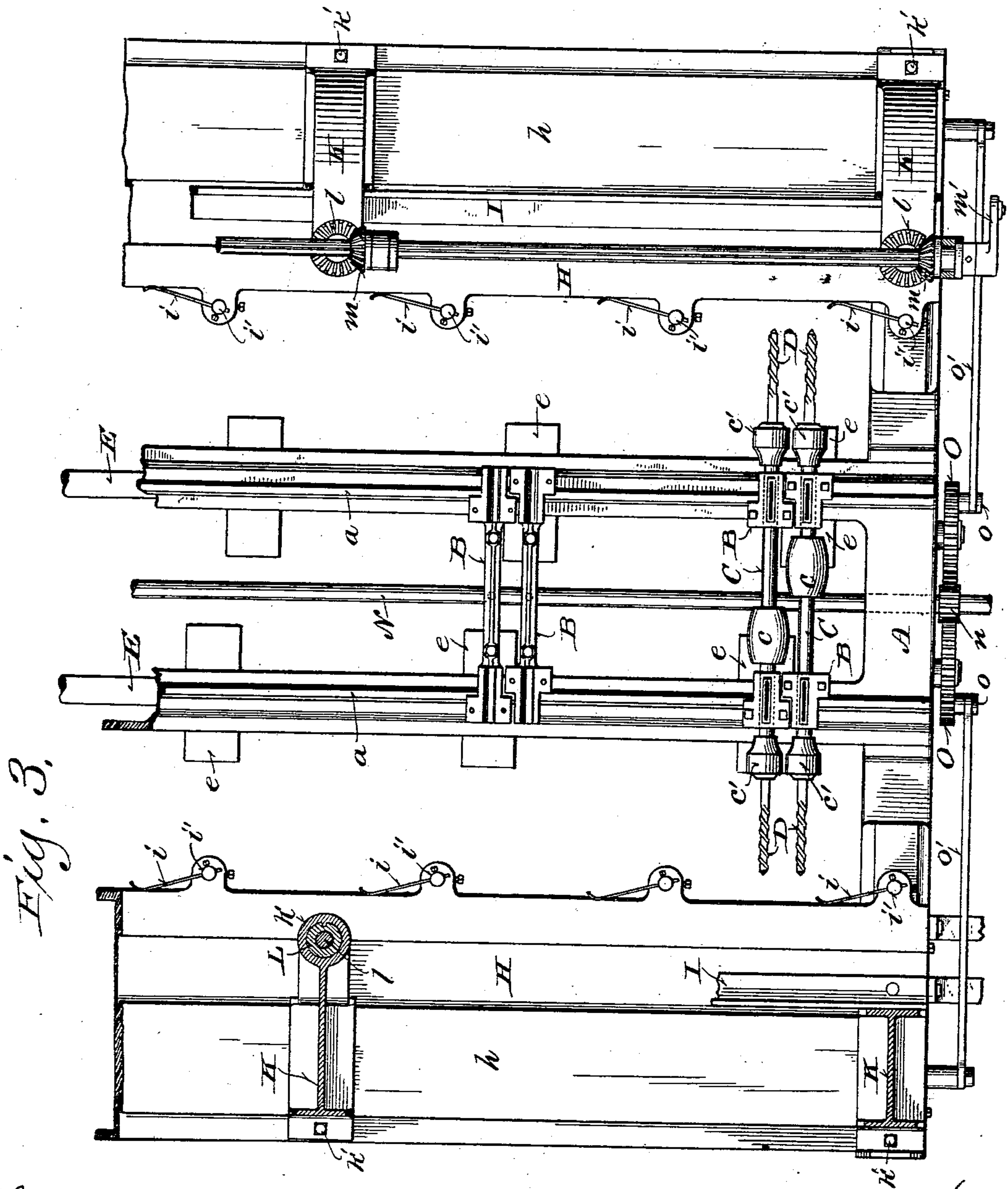
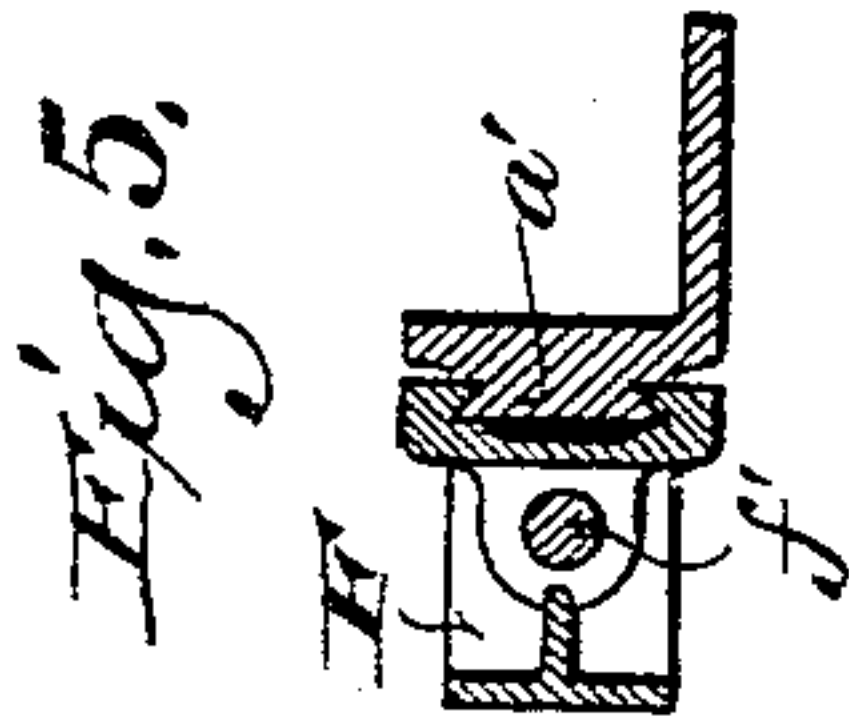


Fig. 3.

Witnesses:
Geo. W. Young;
Chas. L. Goss.



Inventor:
Henry N. Rockwell,
By *Wm. H. Bond* *Smith* *Butt* *Thos*
Attorneys.

UNITED STATES PATENT OFFICE.

HENRY H. ROCKWELL, OF MILWAUKEE, WISCONSIN.

GANG BORING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 560,234, dated May 19, 1896.

Application filed May 15, 1893. Serial No. 474,266. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. ROCKWELL, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Gang Boring-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The main object of my invention is to bore in a single operation one or more series of holes.

It consists of certain peculiarities in the construction and arrangement of the component parts of the machine hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a front elevation of a machine embodying my improvements, portions thereof being broken away and shown in vertical cross-section. Fig. 2 is a side elevation with portions of the machine broken away and a portion at one end shown in vertical section on the line 2 2, Fig. 1. Fig. 3 is a plan view of a portion of the machine. Fig. 4 is a like view of the feeding and stopping mechanism; and Fig. 5 is a horizontal section on the line 5 5, Fig. 1.

A represents the main frame, which is formed or provided on the upper side with longitudinal horizontal ways *a a*.

B B are yokes mounted and adjustable laterally lengthwise of the machine upon the ways *a a* and provided at or near the ends with boxes for the bit-mandrels. They are secured and rigidly held in place when adjusted by clamping bars or plates *b*, attached to the under sides thereof and underlapping at their ends the ways *a a*, as shown in Figs. 1 and 2. These yokes are preferably formed in two parts, as shown in Fig. 1, separable in a horizontal plane to permit of a slight vertical adjustment of the bit-mandrels and the perfect alinement of the bits without the necessity of frequently babbitting the mandrel-boxes to keep the mandrels in perfect alinement. The vertical adjustment and aline-

ment of the mandrels are effected by loosening the screws by which the parts of the yokes are attached to each other and placing between them at either or both ends shims of the required thickness.

C C are the bit-mandrels, which are provided with pulleys *c c* and at both ends with chucks or bit-holders *c' c'*. The pulleys *c c* on adjacent mandrels are arranged out of line with each other, so as to permit of bringing the bits close together. The construction and arrangement of the boxes at the ends of said yokes are also such, as shown in Fig. 3, as to permit of a close arrangement of adjacent mandrels.

D D represent bits, which are necessarily made right and left for use in my machine.

E E are parallel horizontal driving-shafts arranged lengthwise of the machine below the bit-mandrels and provided with suitable bearings at or near the ends in cross-pieces of the frame. They are provided with pulleys *e e*, which are connected by quarter-twist belts with the pulleys *c c* upon alternate bit-mandrels, the pulleys on each driving-shaft being connected with the mandrel-pulleys nearest the same side of the machine. The pulleys *e e* are secured upon said shafts by any means (not shown) which will permit of their adjustment lengthwise thereof to correspond with the adjustments of the bit-mandrels with which they are connected. Each driving-shaft is provided with a pulley *e'*, as shown in Fig. 2, through which power is communicated thereto from any suitable source.

The frame A is provided on each side with brackets F F, mounted and movable vertically upon ways *a' a'* on said frame and formed on their upper sides with horizontal ways *f f*, arranged at right angles to the ways *a a*. These brackets are adjusted and held in place by the screws *f' f'*, having fixed bearings in boxes *a² a²* on the frame and provided at their lower ends with bevel-gears *f² f²*.

G G are horizontal shafts supported in suitable bearings one on each side and lengthwise of the machine. They are provided with bevel-gears *g g*, meshing with the gears *f² f²* and at their front ends, within convenient reach of the operator, with cranks *g' g'*.

H H are work-supporting beds or carriages, arranged one on each side of the machine parallel with the ways *a a* and movable trans-

versely thereto upon the ways $f f$. They are formed with longitudinal ways $h h$ and are provided with longitudinal back guides $I I$ and with front spring-guides $i i$, adjustably held in vertical spindles $i' i'$, which in turn are adjustably secured in holes or sockets in the inner sides of said beds.

$K K$ are standards, mounted and adjustable lengthwise of the machine upon the ways $h h$ and formed with inwardly-projecting vertical sleeves $k k$, overhanging the work-supporting beds. They are also provided with set-screws $k' k'$, by which they are secured in any desired position upon their supporting-ways.

$L L$ are presser-feet, formed with shanks which are movable vertically and held from turning in the sleeves $k k$. $l l$ are adjusting-screws, threaded axially in the shanks of said presser-feet and having fixed bearings in perforated ears formed on said standards above or in line with the sleeves $k k$. They are provided at their upper ends with bevel-gears $l' l'$.

$M M$ are horizontal shafts, arranged one on each side and lengthwise of the machine. They are provided with bevel-gears $m m$, which are freely movable lengthwise thereon and are loosely held by their hubs in engagement with the gears $l' l'$ in brackets $k^2 k^2$ on the standards $K K$. The shafts $M M$ are prevented from turning in said gears $m m$ by splines, feathers, or other suitable means. The two standards $K K$ at the rear end of the machine may be permanently secured to the beds or carriages $H H$, but all of the other standards are adjustable thereon lengthwise of the machine, so as to cause the presser-feet to operate at the desired points upon stuff of different lengths.

N is a horizontal shaft, supported lengthwise of the machine by suitable bearings in the upper part of frame A and provided at or near the ends with pinions $n n$, which mesh with similar gears $O O$ on opposite sides thereof. It is also provided at one end with a tight and a loose pulley n' and n^2 . The gears $O O$ are mounted upon studs projecting from the ends of the frame and are provided with crank-pins $o o$, which are connected by rods $o' o'$ with the ends of the work-supporting beds or carriages $H H$. A belt connects, through the pulley n' or pulley n^2 , with a pulley on a counter or driving shaft. (Not shown.)

P is an angular belt-shifting lever, formed with a fork or loop p , through which the belt passes to the pulleys n' and n^2 and fulcrumed at p' to a bracket attached to the frame A , so as to swing horizontally. It is provided with a dog p^2 , pivoted to its outer end so as to be turned by the operator into and out of range with a pin or projection p^3 , attached to the adjacent carriage H in position to shift the belt from the tight pulley n' upon the loose pulley n^2 , as the carriages are withdrawn into their outer positions. By this arrangement,

when the dog p^2 is turned inwardly, the carriages are automatically stopped in their outer positions after each advance and return movement thereof.

My improved machine operates as follows: The bit-mandrels having been grouped and set in the desired positions, the standards $K K$ correspondingly adjusted to cause the presser-feet $L L$ to bear at the proper points upon the stuff to be held, and the carriages $H H$ adjusted to the proper height according to the thickness of the stuff to be operated upon, by means of the shafts $G G$ and screws $f' f'$ geared therewith, the presser-feet are raised by means of the crank-shafts $M M$ and inter-gearred screws $l l$, and the pieces are inserted by the operator at the front end of the machine endwise between the back guides I and the front spring-guides $i i$, which press and hold them snugly against said guides $I I$. The presser-feet are then forced by the operator down upon said pieces and clamp the same snugly and firmly to the beds of the carriages. The dog p^2 of the belt-shifter is then raised out of engagement with the pin p^3 and the lever P turned manually, so as to carry the belt from the loose pulley n^2 upon the tight pulley n' . Thereupon both carriages are moved forward and a corresponding series of holes are simultaneously bored in the inner sides or edges of both pieces. The dog p^2 being left in range with the pin p^3 is engaged thereby as the carriages return and approach the limits of their outward movement, thereby turning the inner end of lever P forward, carrying the belt from the tight pulley upon the loose pulley and automatically stopping said carriages, which remain quiescent until again started by the operator in the manner above explained.

It is obvious that the bits may be set by the adjustment of the mandrels $C C$ to bore single holes or groups of holes at uniform or irregular intervals. The construction and arrangement of the bit-mandrels and their supports, and the arrangement of their driving connections hereinbefore set forth, enable me to bring the bits very close together in one or more groups, each comprising any desired number of bits, and also to drive the bit-mandrels from shafts journaled in the machine by short quarter-twist belts. I am also enabled to bore two exactly-corresponding sets or series of holes simultaneously in opposite directions. In place of the tight and loose pulley and the belt-shifter for automatically stopping the carriages a clutch with a suitable automatic shifting connection may be substituted. In short, various changes in the construction and arrangement of the component parts of the machine may be made within the scope of my invention.

My improved machine, as shown and hereinbefore described, is specially designed for boring the holes in the stiles of doors to be put together with dowel-joints and is adapted to bore two stiles simultaneously, thus insur-

ing perfect uniformity and accuracy in the spacing of the holes, besides expediting the work, provision being made for variously grouping and arranging the bits and adjusting the machine for making doors of different lengths and thicknesses and having any number or arrangement of rails.

I claim—

1. In a gang boring-machine, the combination of a frame provided with a longitudinally-arranged work-support, a number of transversely-arranged bit-mandrels provided with pulleys, the pulleys of adjacent mandrels being out of line with each other in order to bring said mandrels closer together and two longitudinally-arranged parallel driving-shafts journaled in said frame and provided with pulleys which are connected alternately by quarter-twist belts with the pulleys on said mandrels, substantially as and for the purposes set forth.

2. In a gang boring-machine, the combination of a frame, a longitudinally-arranged carriage movable transversely thereon, a number of transversely-arranged bit-mandrels provided with pulleys, the pulleys on adjacent mandrels being out of line with each other in order to bring said mandrels closer together, and two longitudinally-arranged parallel driving-shafts journaled in said frame and provided with pulleys which are connected alternately by quarter-twist belts with the pulleys on said mandrels, substantially as and for the purposes set forth.

3. In a gang boring-machine, the combination of a suitable frame a number of transversely-arranged bit-mandrels provided with chucks or bit-holders and with pulleys, the pulleys of adjacent mandrels being out of line so as to permit of the mandrels being brought close together, and two longitudinally-arranged parallel driving-shafts journaled in said frame provided with pulleys, the pulleys on adjacent mandrels being connected by quarter-twist belts with pulleys on different driving-shafts, substantially as and for the purposes set forth.

4. In a gang boring-machine, the combination of a suitable frame provided with longitudinal ways, a number of bit-supports adjustable lengthwise of the machine on said ways, and provided with bearings for the bit-mandrels, a number of transversely-arranged bit-mandrels supported in said bearings and provided with bit chucks or holders and with pulleys, the pulleys on adjacent mandrels being out of line with each other, and two longitudinal driving-shafts journaled in said frame and provided with pulleys which are adjustable lengthwise thereof, and connected alternately by quarter-twist belts with pulleys on said mandrels, substantially as and for the purposes set forth.

5. In a gang boring-machine, the combination with a suitable frame, of a number of parallel bit-mandrels having bearings therein, a carriage movable to and fro endwise of

said mandrels and provided with standards having vertical sleeves overhanging the bed of said carriage, vertically-movable presser-feet, the shanks of which are movable lengthwise, but held from turning in said sleeves, adjusting-screws having bearings in said standards and threaded in the shanks of said presser-feet, and a shaft having bearings in said standards and provided with bevel-gears which mesh with similar gears on said screws, substantially as and for the purposes set forth.

6. In a gang boring-machine, the combination with a suitable frame, of a number of bit-mandrels mounted transversely thereon and adjustable lengthwise of said frame, a carriage mounted upon and movable transversely to said frame and furnished with standards adjustable lengthwise thereof and provided with presser-feet, screws connecting said standards and presser-feet and provided with bevel-gears, and a longitudinal shaft provided with similar gears feathered thereon and held by bearings in said standards in mesh with the gears on said screws, substantially as and for the purposes set forth.

7. In a gang boring-machine, the combination of a suitable frame, a number of horizontal bit-mandrels arranged transversely thereon, laterally-movable carriages arranged longitudinally upon said frame at opposite ends of said mandrels, a driving-shaft between and parallel with said carriages and provided at or near its ends with pinions and gears meshing with opposite sides of said pinions and provided with cranks which are connected directly by rods with said carriages so as to move the same simultaneously toward and from the ends of said mandrels, substantially as and for the purposes set forth.

8. In a gang boring-machine, the combination of a suitable frame, a number of horizontal bit-mandrels arranged transversely thereon, a laterally-movable work-support or carriage arranged longitudinally upon said frame, cranks which are connected by rods with said carriage at or near its ends, a driving-shaft connected by gears with said cranks and provided with tight and loose pulleys, and an automatic belt-shifter, arranged to be operated by a trip or projection on said carriage, substantially as and for the purposes set forth.

9. In a gang boring-machine, the combination of a frame provided with longitudinal ways, a number of transversely-arranged mandrel-supports adjustable lengthwise of the machine upon said ways, mandrels having bearings in said supports and provided at both ends with chucks or bit-holders and between their bearings with pulleys, the pulleys on adjacent mandrels being out of line with each other, two shafts journaled in said frame parallel with said ways and provided with pulleys which are connected alternately by quarter-twist belts with the pulleys on said mandrels, two carriages supported parallel with said ways and movable transversely

thereto toward and from said mandrels, one on each side of the machine, a longitudinal driving-shaft provided at or near the ends of the machine with pinions, two gears meshing
5 with opposite sides of said pinions and provided with crank-pins which are connected by rods with said carriages, substantially as and for the purposes set forth.

10 10. In a gang boring-machine, the combination of a suitable frame provided with longitudinal ways, a number of transversely-arranged mandrels supported and adjustable lengthwise of the machine upon said ways and provided at both ends with chucks and
15 at intermediate points with pulleys, the pulleys on adjacent mandrels being out of line with each other, two driving-shafts parallel with said ways and provided with pulleys, the pulleys of adjacent mandrels being con-
20 nected with pulleys on different driving-

shafts by quarter-twist belts, vertically-adjustable brackets connected with opposite sides of said frame and provided on their upper sides with horizontal ways parallel with said mandrels, two carriages supported one on 25 each side of the machine lengthwise thereof and movable laterally upon said ways toward and from said mandrels, two cranks on each side of the machine connected with the adjacent carriage, and a driving-shaft connected 30 by gears with said cranks, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

HENRY H. ROCKWELL.

Witnesses:

CHAS. L. GOSS,

A. A. L. SMITH.