

No. 626,884.

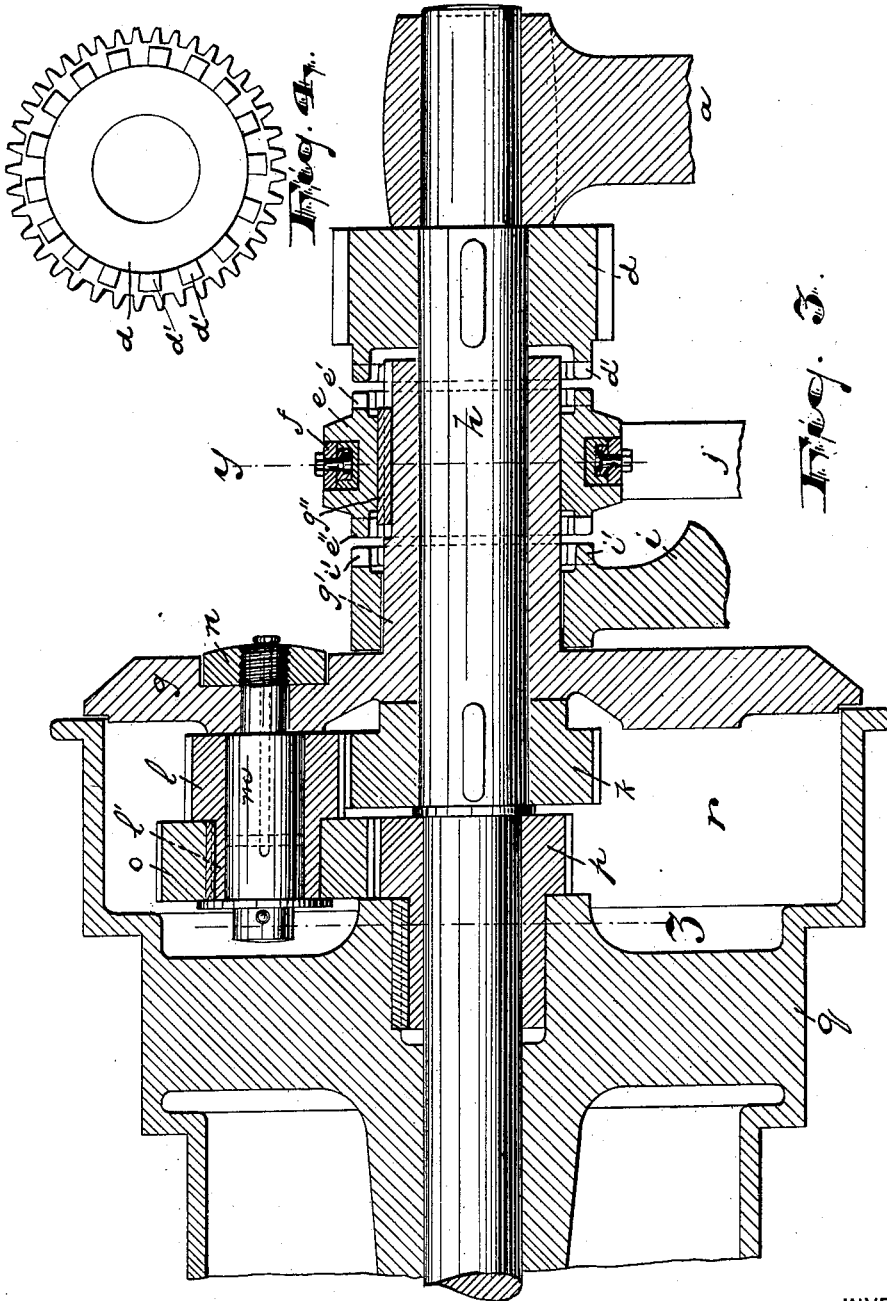
Patented June 13, 1899.

H. B. BINSSE.
GEARING.

(Application filed May 4, 1898.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES:

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INVENTOR,

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BY

Drake

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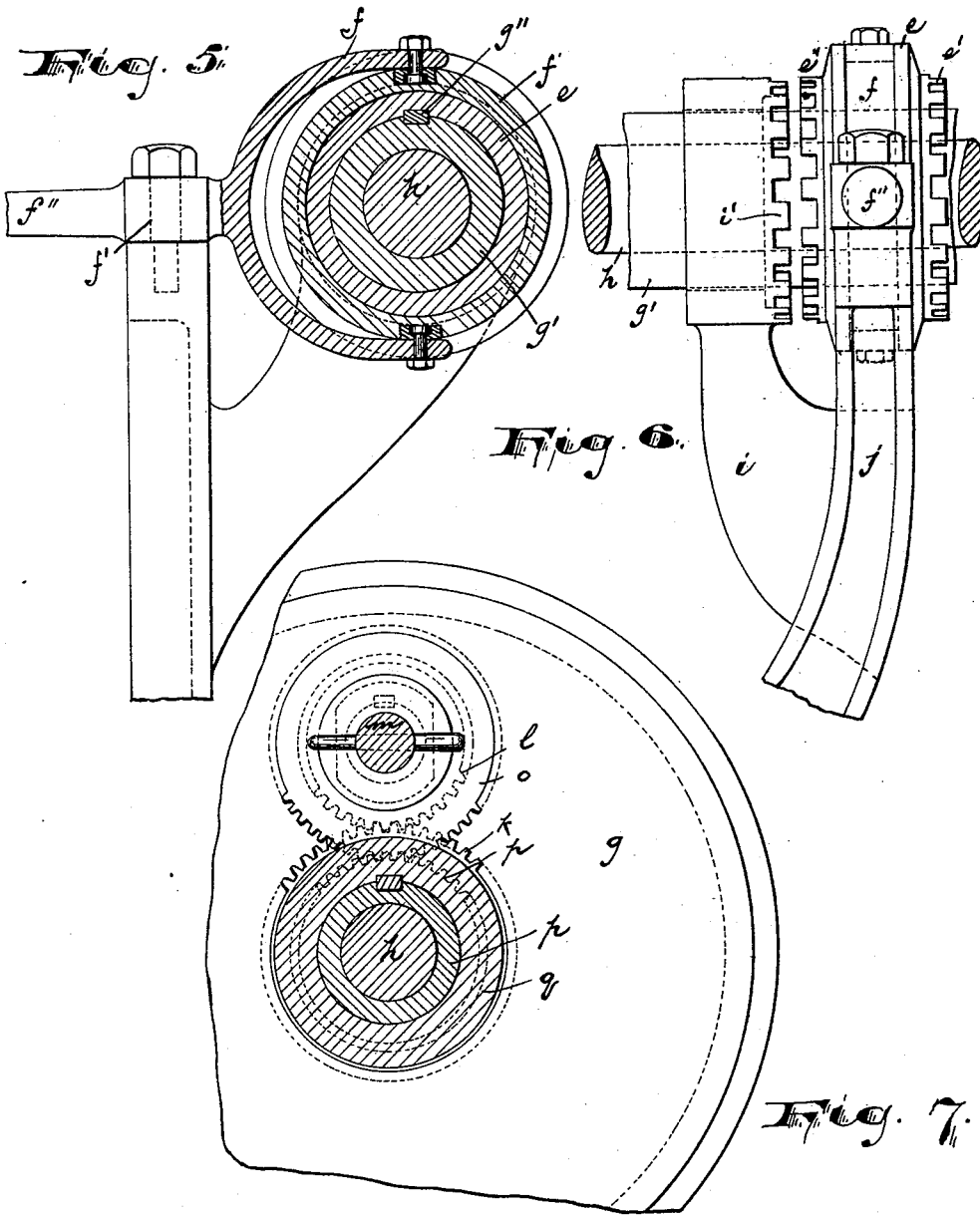
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UNITED STATES PATENT OFFICE.

HENRY B. BINSSE, OF NEW YORK, N. Y.

GEARING.

SPECIFICATION forming part of Letters Patent No. 626,884, dated June 13, 1899.

Application filed May 4, 1898. Serial No. 679,691. (No model.)

To all whom it may concern:

Be it known that I, HENRY B. BINSSE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Gearing for Machine-Tools; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to an improved means for the transmission of power for machine-tools and for all machinery driven by power at variable speeds, taking as an example the horizontal boring and drilling machine, a tool used in machine constructions for boring either single or twin cylinders and for work of a like character. It has been the practice to drive this machine by a cone-pulley and back-gearing, following exactly the well-known construction usual for lathes, in which a cone-pulley revolves upon the main spindle and a gear is keyed to the spindle. The cone can be connected either directly with this gear, in which case the spindle revolves at the same speed as the cone, or indirectly by a system of compound gears or so-called "back-gears," in which latter case the spindle revolves slower than the cone by a certain ratio fixed by the proportions of the compound gearing.

In lathes, boring-machines, and similar tools where the cut may be taken upon cylinders ranging in diameter between certain limits provision must be made for changing the driving speed, because the cutting speed must remain constant, while the number of rotations per minute varies according to the diameter of the piece in the lathe or machine.

The cone and the gearing should be designed to give the correct speeds for all diameters coming within the scope of the machine, but in practice it has not been possible heretofore to reach this result, because as the diameter of the work increases greater power is needed to drive the cut, and this increase is not a simple one depending alone on the ratio of the cylinders, but it is influenced by

several other factors. It has been found that a system designed with the usual back-gearing construction to give a correct speed ratio is lacking in power and, on the other hand, that if the cone-gearing dimensions be designed to furnish sufficient power some of the speed changes will be practically useless. Therefore cone-gearing designed for machine-tools has been a matter of compromise hitherto, no lathe possessing a correct range of speeds together with sufficient power, the best result being only approximate.

The objects of the present invention are to secure a correct ratio between the direct and the geared speeds, together with any desired amount of power, to enable the back-gearing to be placed out of the way of the belts, so that the cone may be driven at any belt-angle and the power changed from direct to gear speeds or disengaged altogether by a simple motion of a handle, and to secure other advantages and results, some of which may be referred to hereinafter in connection with the description of the working parts.

The invention consists in the improved means for transmitting power in machine-tools and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth, and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several views, Figure 1 is a front elevation of a portion of a boring-machine embodying my improvements. Fig. 2 is an end view of the same, on an enlarged scale, taken at line *x* Fig. 1. Fig. 3 is a section taken through the driving cone and gearing, the section being taken on the axis of the cone-shaft. Fig. 4 is a face or end view of a driving-gear provided with clutch-teeth. Fig. 5 is a sectional detail of a certain shifter, taken at line *y*, Fig. 3. Fig. 6 is a side elevation of the same; and Fig. 7 is a sectional detail view taken at line *z*, Fig. 3.

In said drawings, *a* indicates a suitable bed-plate, and *b* a shaft or spindle arranged in suitable bearings therein and having a suitable gear or cog wheel *c*, adapted to receive its power from a pinion *d* on the cone-shaft *h*. Said pinion *d* is provided at one of its sides with clutch-teeth *d'*, which are adapted

to intermesh with a shifting clutch member *e*, having cooperating clutch-teeth *e' e''* at its opposite sides or ends. Said clutch member *e* consists of an annular piece having a peripheral groove to receive the prongs of a forked shifting lever *f*, fulcrumed at *f'* at any desirable or convenient point of operation, the said lever being provided with a handle *f''*, by means of which it may be operated with greater convenience by the attendant on the machine. The said annular clutch member *e*, having clutch-teeth on each side, slides upon the hub *g'* of a gear-carrier plate *g*, the said hub serving as a slideway, being provided with a longitudinal groove to receive a spline *g''*, by means of which the said annular clutch member *e* may be moved longitudinally with relation to said hub, but is compelled to rotate therewith on the cone-shaft *h*. The gear-wheel *d* is keyed to said cone-shaft *h*, while the gear-carrier plate *g* and its hub *g'* are loose upon said shaft, so as to rotate or revolve thereon independently. The carrier-plate, however, is prevented from moving to any material degree lengthwise upon said shaft by means of gear-wheels *k* and *d*, fixed upon said shaft, which serve as end or side bearings for the plate *g* and its hub, as will be understood upon reference to Fig. 3. Between the gear-wheels fixed to the shaft are arranged on said hub a fixed and a shifting clutch member, while the gear-wheel *d* is in itself a third clutch member.

Between the gear-plate *g* and the clutch *e* is arranged a toothed clutch-arm *i*, encircling the hub *g'*. The teeth *i'* of this arm or bracket *i* intermesh with the teeth *e''* of the said annular clutch member *e*. Said arm *i* is rigidly fastened to the bed-plate *a* in any suitable manner, being preferably cast in one piece with the support *j*, upon which the shifter-lever *f* is pivoted.

Upon the cone-shaft *h* at the side of the gear-plate *g* is keyed a gear-wheel *k*, which revolves with said shaft. Said gear-wheel *k*, keyed to the shaft *h*, meshes with a pinion *l*, carried by a stud *m*, which is fixed to the gear-plate *g*. Said pinion *l* is free to turn on the stud *m* and is provided with a hub *l'*, to which is keyed a second gear-wheel *o*, which in turn engages with a pinion *p*, loose upon the cone-shaft *h*, but keyed to the cone *q*.

The cone *q* is suitably chambered, as at *r*, to receive the gearing-train *k l o p*, the plate *g* acting as a cover for the said chamber, so that the said train of gear-wheels is out of the way of the belting and is protected from dirt, dust, and breakage by foreign substances falling between the gears.

The belt-power applied to the cone-wheel *q* is transmitted therefrom to the gear-wheel *p*, which transmits said power through the train of wheels *o l k* to the shaft *h*. From thence the power is applied to the gear-wheel *d*, gear-wheel *c*, and the spindle *b*.

When the clutch member *e* engages with the gear *d*, the carrier-plate *g* is locked to the

shaft *h*. In this condition the gears *o l* cannot revolve and the power is transmitted directly to the shaft *h*, which revolves at the same speed as the driving-cone.

By throwing the clutch *e* into engagement with the fixed clutch *i* the carrier-plate *g* is held still, while the shaft *h* is free to revolve within it. In this case the power from the gear-wheel *p* is transmitted to the gear-wheel *k* and the shaft *h* after reduction by passing through the gear system *p o* and *l k*, the amount of this reduction being clearly a question of design only.

When the clutch member *e* is disengaged from both its cooperating clutch members and stands in a position substantially as shown in Fig. 3, then the shaft *h* is idle, so that power is not transmitted to the spindle *b*.

Having thus described the invention, what I claim as new is—

1. The combination with the main spindle *b*, and the gear-wheel *c*, thereon, of a cone-shaft *h*, having the cone, gear-wheel *k*, and gear-wheel with clutching-surfaces thereon, a gear-wheel carrier also arranged on said shaft *h*, and free to rotate thereon and held from material motion endwise of the shaft, a fixed clutch member, a shifting clutch member movable between said fixed clutch member and said clutch gear-wheel on said shaft *h*, and a train of gear-wheels transmitting power from the cone to said wheel *k*, certain of the wheels of said train being carried by said gear-wheel carrier, substantially as set forth.

2. The combination with the main spindle *b*, and gear-wheel *c*, thereon, of a cone-shaft *h*, cone, gear-wheel *k*, and clutch gear-wheel *d*, thereon, a gear-wheel carrier also arranged on said shaft *h*, and free to independently rotate thereon, and held from material movement lengthwise of the shaft by said gear-wheels *k*, and *d*, a fixed clutch member, a shifting clutch member disposed between said fixed clutch member and said clutch gear-wheel *d*, and a train of gear-wheels transmitting power from the cone to said wheel *k*, substantially as set forth.

3. The combination with the bed-plate, main spindle *b*, and gear-wheel *c*, thereon, of a cone-shaft *h*, cone, gear-wheel *k*, and clutch gear-wheel *d*, thereon, a gear-wheel carrier also arranged on said shaft *h*, and free to independently rotate thereon, said carrier having at one side a hub providing a slideway for a sliding clutch member, a fixed clutch member fastened to the bed-plate and encircling the hub, a shifting clutch member arranged on the slideway, of the hub and movable into engagement with the fixed clutch member and clutch gear-wheel and a train of gear-wheels transmitting power from the cone to gear-wheel *k*, substantially as set forth.

4. The combination with the shaft *h*, of the clutch member *d*, keyed thereto, a fixed clutch member *i*, a shifting clutch member, a plate *g*, free to turn on said shaft but held from movement lengthwise of said shaft and hav-

ing a hub on which said shifting clutch member is arranged to slide, means for keying said hub and shifting clutch member and preventing independent rotation, a wheel or pulley *q*, arranged on said shaft and a train of gear-wheels transmitting power from said wheel or pulley *q*, to said shaft, certain wheels *l*, *o*, of said train being carried by the said carrier-plate, substantially as set forth.

5 5. The improved gearing for machine-tools comprising a cone-shaft having two pinions or gear-wheels fixed thereon, and a carrier-plate loosely mounted on said shaft between said pinions and having a hub at one side, a hollow or chambered cone, the chamber of which is closed by said carrier-plate, a train of gear-wheels inclosed within the driving-cone and including one of the fixed gear-wheels above referred to and certain of the wheels of said train being carried by said carrier-plate at the side thereof opposite the hub, a coupling member arranged on said hub and adapted to be shifted to be brought into coupling engagement with either the pinion on the cone-shaft outside of said chamber to lock the several parts mentioned to said shaft and cause the power applied to the cone to be transmitted directly to the shaft, or with a stationary part to lock the said carrier-plate

to said stationary part whereby the power 30 will be transmitted to the shaft through the inclosed train of gear-wheels, the stationary part and pinion being each adapted and arranged to clutch with the said coupling member, substantially as set forth. 35

6. The combination with the spindle and its cog or gear wheel *c*, of a counter-shaft *h*, having a gear-wheel or pinion *d*, fixed upon said shaft and meshing with said wheels, *c*, and having clutch-teeth, a plate *g*, loose upon said shaft and having a hub *g'*, extending close to the said wheel *d*, a fixed clutch member *i'*, a shifting clutch member keyed upon said hub, but free to slide longitudinally thereon, into engagement with the fixed clutch member *i*, and wheel *d*, a hollow cone-wheel, a train of cog or gear wheels arranged within said cone-wheel and transmitting motion from said cone-wheel to said counter-shaft, certain wheels *l*, *o*, of said train being carried 40 by said plate *g*, substantially as set forth. 45 50

In testimony that I claim the foregoing I have hereunto set my hand this 3d day of May, 1898.

HENRY B. BINSSE.

Witnesses:

C. B. PITNEY,
RUSSELL M. EVERETT.