(No Model.) 2 Sheets—Sheet 1.

B. B. POWELL.

SPEED CHANGING MECHANISM.

No. 324,955. Patented Aug. 25, 1885.

Fig. 1.

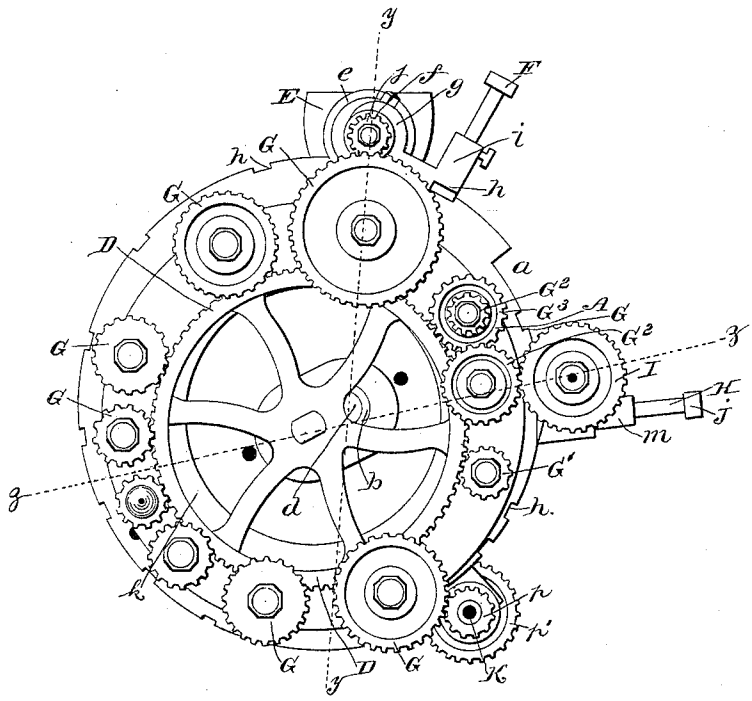
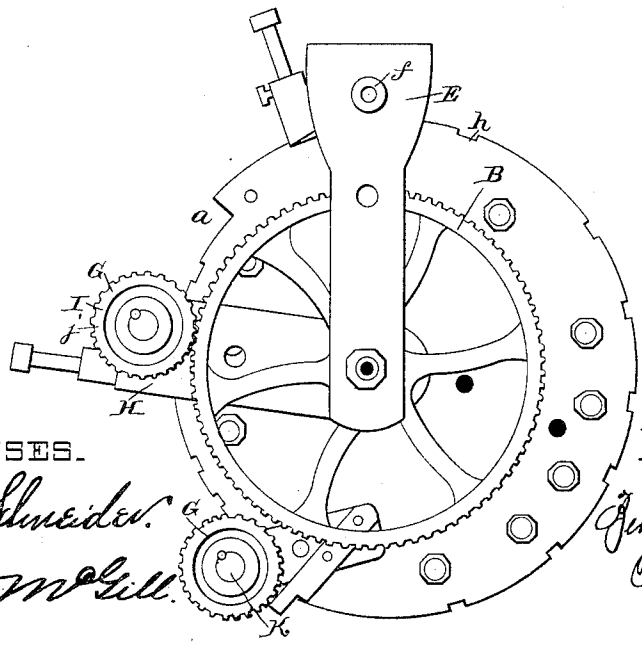


Fig. 2.



WITNESSES.

W. J. Schneider.

J. Thos. McGill.

INVENTOR.

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ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

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SPEED CHANGING MECHANISM.

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Fig. 3.

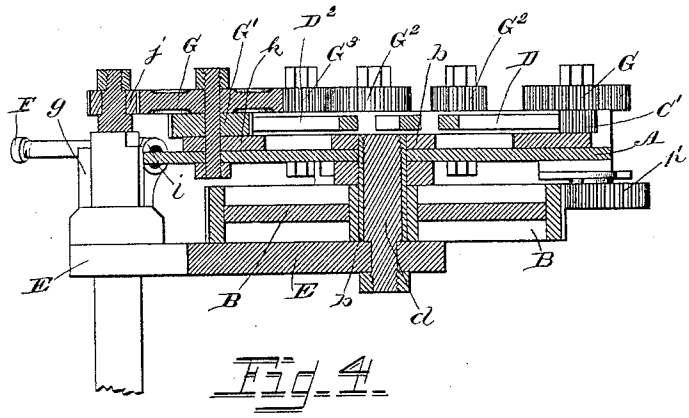
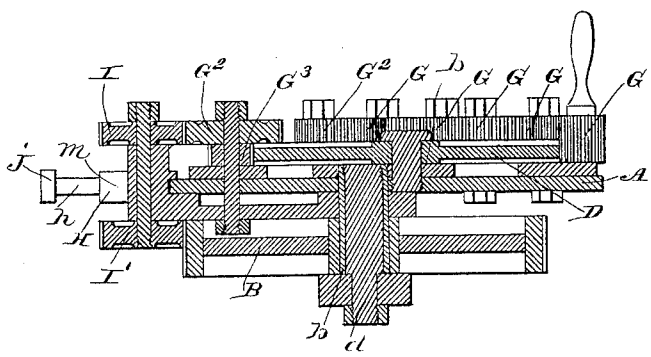


Fig. 4.



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UNITED STATES PATENT OFFICE.

BENJAMIN B. POWELL, OF PETOSKEY, MICHIGAN.

SPEED-CHANGING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 324,955, dated August 25, 1885.

Application filed September 13, 1884. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN B. POWELL, a citizen of the United States of America, residing at Petoskey, in the county of Emmet and State of Michigan, have invented certain new and useful Improvements in Speed-Changing Mechanism, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention contemplates improvements upon the speed-changing mechanism upon which Letters Patent were granted to me on the 24th day of April, 1883, the same being numbered 276,463, the said improvements having for their object to promote cheapness, simplicity, effectiveness, durability, and compactness, and to secure greater convenience in the adjustment or manipulation of the machine in effecting the change of speed, and to move said mechanism to or away from the lathe-screw or driven shaft in substituting or exchanging a pinion or wheel of one size for that of another size, according to the rate of speed required.

A further object is to allow the pinions upon the side of the disk or blind wheel to be put into gear with a wheel or gearing upon the opposite side of said disk or blind wheel; and still further objects are to provide an extended bearing-surface for the driving-shaft and the disk or blind wheel, and to support or dispose the driving-shaft contiguously to the point of application of the driving-power of said mechanism, to insure certainty of engagement of the speed transmitting wheels or pinions with those upon the side of the disk or blind wheel, and to effect the suspension of the mechanism independently of the lathe.

The invention consists, therefore, of the sundry combinations of parts and their construction, substantially as hereinafter more fully set forth and claimed.

In the accompanying drawings, Figures 1 and 2 are opposite side elevations of my improved speed-changing mechanism. Fig. 3 is a vertical section thereof on the line *y y;* and Fig. 4 is a horizontal section taken on the line *z z.*

In common with the purpose of the invention covered by my aforesaid patent, these improvements are specially designed to serve as a thread-cutting and feed-gear for lathes, while they are also equally applicable for other purposes where a change of speed is necessary.

In the embodiment of these improvements I employ, as in said patented invention, a disk or blind wheel, A, which, however, materially differs from that previously employed in that in the present instance it is reduced diametrically at certain points, being cut away or having a segment of its surface removed, as at *a*, whereby the pinions or gearing (hereinafter described) are enabled to be disposed much nearer than formerly to the plane of its center, or in a much less compass or space more compactly. Furthermore, this disk is cast or formed with a central hub or sleeve, *b*, whose bore is in alignment with an aperture in said disk or wheel, and through which aperture and sleeve or hub passes the center pin or axis, *d*, and upon which hub or sleeve is mounted the spur-wheel B, instead of upon said pin, as heretofore. Also disposed upon a pin or stud projecting from the disk at one side of the pin *d*, the same as in my former invention, is the eccentric toothed wheel D, being suitably secured thereon, as clearly shown in the vertical sectional view, the function of which wheel will appear further on. The hub or sleeve *b*, while adding solidity and strength to the disk, provides an extended bearing for said disk upon the center pin or axis *d*, and forms itself an axis for the spur-wheel B, whereby the wear is distributed and the said parts free from oscillation, making the same reliable and certain in action. The outer (or one) end of the said pin *d*, unlike in the aforesaid patent, is supported in the lower end of a separate bracket or arm, E, instead of in the lathe-head, thus supporting or suspending the entire mechanism or contrivance independently of the lathe, while the said arm or bracket itself may be connected or supported directly thereon or from other convenient point or support, according to the service to which the said mechanism may be appropriated. This independent arm or bracket E, in addition to having holes in its upper end, as it has to receive bolts or other suitable fastenings to secure it in a substantial upright position, is also provided at said end, upon its inner side, with a boxing or sleeve, *e*, cast with or otherwise rigidly connected to said arm, and whose bore is in a coincident plane with an aperture in

said arm or bracket, through which aperture and sleeve or boxing passes the driving-shaft *f*, the latter being thus provided with an extended bearing to render it stable or steady in its action. This arm or bracket will also (forming in itself a pivot or fulcrum for the center pin) permit of moving or swinging the mechanism away from the driven shaft or lathe-screw, or, rather, from the pinion of the latter, to exchange said pinion or wheel for one of a different size or diameter, as may be required in securing the speed desired, after which the said mechanism can, by slowly relaxing the pressure thereon exerted to move or swing it away from said shaft, be returned to its normal position, bringing its coincident pinion into engagement with the pinion of said shaft again ready for action. The shaft, sleeve, or boxing *e* has affixed or connected to it (it may be by holding-screws) an arm or support, *g*, which overhangs the periphery of the disk or wheel A and supports the spring-bolt F, which is adapted to engage or enter the opposite one of a number of notches, *h*, in said periphery of disk, and thus effect the holding firmly or steadily of the contrivance or mechanism either when in use or when the same is moved or swung away from the driving-shaft, as above recited. To permit the passage through it the arm or support *g* is of course provided with an aperture. Cast or formed with said support, around the upper edge of said opening, is a shouldered sleeve or open-top cap, *i*, which contains the spring *i'*, acting upon the bolt F, and through which cap also the bolt passes.

Upon the inner end of the driving-shaft *f*, which is by reason of its aforesaid arrangement brought into the closest possible contiguity with the differential pinions, (presently described,) is secured a pinion, *j*, which is thereby permitted to be made of the smallest possible diameter, whereby great compactness in disposition and reduction in size of the parts are obtained.

The disk or blind wheel A, instead of having sliding studs or axes extending through it, as in my previous invention, is provided with short fixed studs or axes *k* at one side, upon which axes are supported the differential pinions G G', the same being of sundry sizes or diameters, one set of which pinions, G', is adapted to gear with the eccentric wheel D, while the other set, G, as the blind wheel or disk A is turned, is adapted to successively gear with the driving-pinion *j* to produce the desired change of speed, as will be explained further on. The eccentric wheel D in my present invention is greatly reduced in diameter as compared to, although having a like eccentricity of arrangement as, the wheel answering thereto in my former invention, by which reduction still further compactness and concentration of the parts are secured, together with increased strength, durability, and cheapness.

H is the lever which is pivoted upon the central pin or axis, *d*, and reaches out and projects beyond the periphery or edge of the disk or blind wheel A, said lever having a lateral arm extending past the reduced peripheral edge of said disk. This arm has upon its inner surface a groove or recess, *l*, to receive the said edge of the disk or wheel A to prevent lateral displacement or shifting of the lever with its pinions, presently described. This lever-arm carries two transmitting pinions or wheels, I I, supported upon a short shaft bearing in the said arm, one of which pinions I gears, as the arm or lever is turned, successively with any one of the set G of a second series of differential pinions, while the other pinion I is adapted to continuously gear with the spur-wheel B upon the opposite side of the device, which gears with and drives the pinion on the lathe or screw shaft. The series of differential pinions G G are also supported upon fixed studs or axes upon and at one side of the disk or blind wheel, and the other set G gears with the eccentric wheel D.

J is a spring-bolt passing through the lever-arm and an open-ended cap or sleeve, *m*, cast or formed upon said arm around the upper edge of the opening therein through which said bolt passes, said bolt being projected and held in the coincident one of a number of notches, *n*, in the reduced peripheral edge of the disk or blind wheel A by the action of a spring, *o*, inclosed within said cap or sleeve *m* to permit of the adjustment and retention of said lever with its pinions in gear with any one of the pinions of the differential gearing G.

Supported in a projection or extension of the blind wheel or disk A, at its lower front edge, is a short shaft, K, carrying two pinions, *p p*, of different diameters, one of which pinions *p* is adapted to gear with one of the series of pinions G of different diameters, while the other pinion, which is arranged upon that end of the said shaft projecting beyond the opposite side of the disk or blind wheel A, is put into engagement with the pinion of the lathe-screw, whereby, while motion is thus derived from the lathe-screw to operate the speed-changing mechanism, additional combinations or changes of speed can be had through said pinions G.

In operation it will be seen that motion is communicated or transmitted by that one of the series of wheels or pinions G which has been put into gear with the driving-pinion *j* whose shaft *f*, being or answering to the lathe-spindle, is thus put in motion by the action of the lathe, said shaft having a fixed number of revolutions. The motion thus secured through the aforesaid pinions is communicated to the eccentric wheel D through the pinions G fixed to the gear wheels or pinions G, and is thence transferred from the wheel D, through the pinions G and G, in gear with said wheel D, and the lever-pinion I to the lever-pinion I, and from the latter to the spur-wheel B, from whence it is communicated by another

pinion to the lathe-screw. The speed of said screw or shaft relatively to that of the shaft *f* will depend upon the particular pinions of the series of differential pinions G G put into gear with the pinion *j* and eccentric wheel D by the shifting of the blind wheel A through the lever H and the spring-bolt J, and upon the particular pinions of the series G G put by the movement of the lever H in gear with the eccentric wheel D and pinion I. The lever H is so adapted that when thrown up or adjusted it will put said wheel and its pinions in gear, after which said lever is locked in position by the action of the spring-bolt J. Thus the lever is adapted to adjust or turn the blind wheel or disk to set any one pair of the series of pinions G G in working gear or position. I have extended one of the spindles of the pinions, as at *q*, to be grasped when it is inconvenient to reach the lever H to turn the disk or blind wheel.

The pinion I, as before intimated, is always in gear with the spur-wheel B, and when set in motion by the engagement of the pinion I with any one of the pinions G of one set of the series of pinions G G, motion is transmitted, as required, to the screw spindle or shaft with the requisite speed relatively to the said spindle or shaft, the particular pinions of the series of differential gears G G necessary to produce a given velocity to the screw or shaft having been adjusted, by the turning of the blind wheel or disk A, to engage with the pinion *j* and wheel D, as hereinbefore described.

The spur-wheel B may have either a straight-faced or beveled periphery, the latter or beveled-surfaced periphery enabling it to gear with a right-angularly-disposed shaft.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a speed-changing mechanism, the blind wheel or disk, together with actuating mechanism, substantially as and for the purpose set forth.

2. In a speed-changing mechanism, the disk or blind wheel supporting arm or bracket provided with a support having a spring-retaining bolt to engage and hold the said disk, the latter being notched to receive the lower end of said bolt, substantially as and for the purpose set forth.

3. In a speed-changing mechanism, the blind wheel or disk having a segment of its surface removed along its periphery, substantially as shown and for the purpose described.

4. In a speed-changing mechanism, the disk or blind wheel having a recess or notch along or in its periphery, in combination with the shifting or adjusting lever, with its pinions engaging or gearing pinions of said disk, substantially as shown and described.

5. In a speed-changing mechanism, the shifting or adjusting lever having a lateral extension or arm provided upon its inner surface, with a groove or recess to receive the edge or periphery of the disk or blind wheel, substantially as and for the purpose set forth.

6. In a speed-changing mechanism, the combination, with the blind wheel or disk, of the shifting or adjusting lever having a lateral extension or arm provided with a spring catch or bolt with its inner end bearing in notches in the periphery of said disk or wheel, substantially as shown and described.

7. In a speed-changing mechanism, the bracket or arm E, having the central pin or axis, *d*, in combination with the blind wheel or disk A, having a sleeve or hub through which said pin passes, and the spur-wheel B, mounted loosely upon said disk, sleeve, or hub, substantially as shown and described.

8. In a speed-changing mechanism, the disk or blind wheel having fixed projecting studs or spindles carrying gearing, substantially as shown and described.

9. In a speed-changing mechanism, the disk or blind wheel having a hub projecting therefrom and itself serving as a support or axis, substantially as shown and described.

10. In a speed-changing mechanism, the disk or blind wheel having at or near its edge an arm or projection supporting a spindle-bearing, pinions disposed upon each end of said spindle, one of said pinions gearing with a pinion of said disk and the other pinion adapted to engage with a pinion or wheel upon the opposite side of the disk, substantially as shown and described.

11. In a speed-changing mechanism, disk or blind wheel supporting arm or bracket having a tubular bearing or boxing to receive and provide an extended bearing for the driving-shaft, substantially as shown and described.

12. In a speed-changing mechanism, the combination, with the disk or blind wheel and its concentrically-supporting pin or axis, together with its differential gearing, of the eccentric wheel disposed alongside of said disk or wheel to expose a large area of the latter to provide for the disposition thereon of additional gearing, substantially as shown and described.

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

BENJAMIN B. POWELL.

Witnesses:
M. W. GEORGE,
A. P. HEASLEY.