(No Model.) 3 Sheets—Sheet 1.

J. L. BOGERT.

CHANGEABLE SPEED GEARING.

No. 554,047. Patented Feb. 4, 1896.

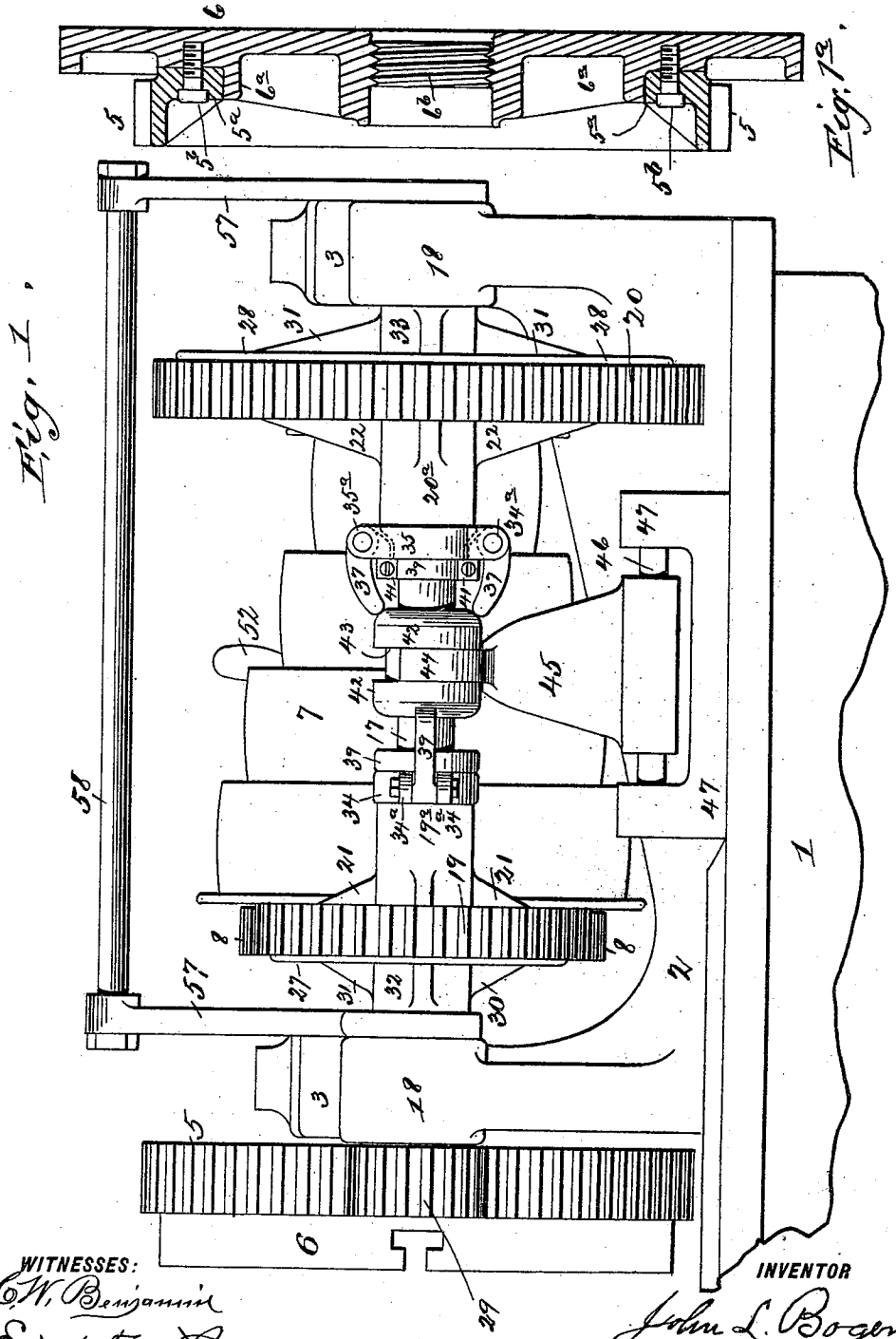

Fig. 1.

Fig. 1a.

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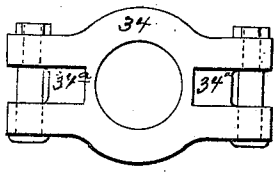

Fig 5

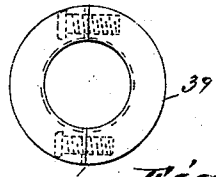

Fig. 6.

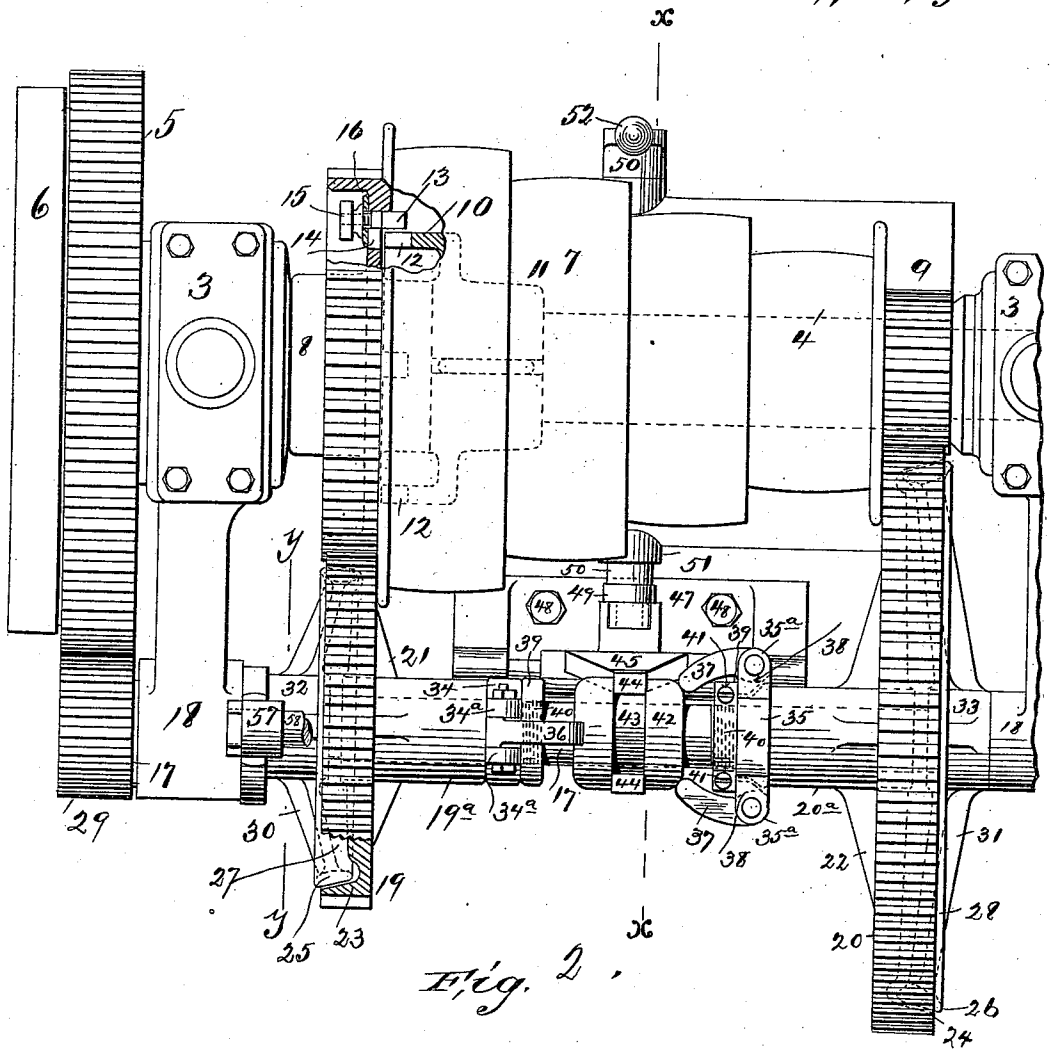

Fig. 2.

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Fig 2a

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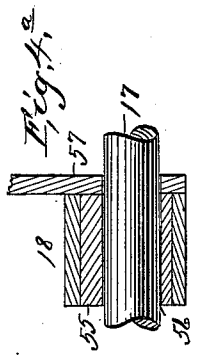

Fig. 4a.

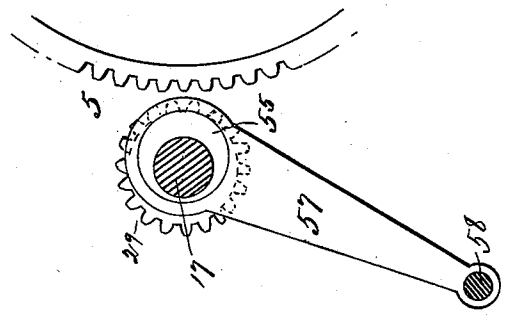

Fig. 4.

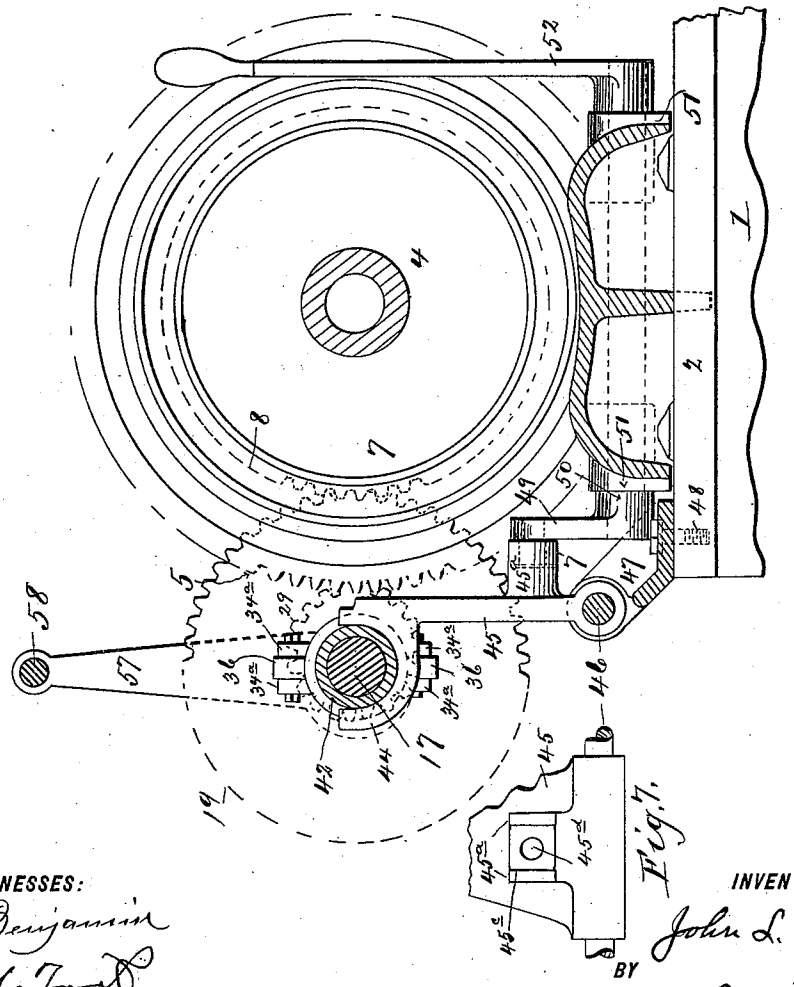

Fig. 3.

Fig. 7.

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UNITED STATES PATENT OFFICE.

JOHN L. BOGERT, OF FLUSHING, NEW YORK.

CHANGEABLE-SPEED GEARING.

SPECIFICATION forming part of Letters Patent No. 554,047, dated February 4, 1896.

Application filed October 24, 1894. Serial No. 526,787. (No model.)

To all whom it may concern:

Be it known that I, JOHN L. BOGERT, a resident of Flushing, Queens county, New York, have invented certain new and useful Improvements in Changeable-Speed Gearing, of which the following is a specification.

The object of my invention is to provide means for rotating a moving part—such, for instance, as a face-plate of a lathe—at different speeds, when desirsd. By this means small work can be rotated at high speed, and larger work, having a greater moving surface, can be rotated at a slower speed, whereby the speed of movement of the work against a tool can be regulated as desired.

The invention consists in the novel details of improvement and the combinations of parts, that will be more fully hereinafter set forth, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part hereof, wherein—

Figure 1 is a front elevation of my improved changeable-speed gearing. Fig. 1^a is a section of the face-plate and gear attached. Fig. 2 is a partly broken plan view thereof. Fig. 2^a is a detail of a spring. Fig. 3 is a cross-section on the line $x\ x$ in Fig. 2. Fig. 4 is a cross-section on the line $y\ y$ in Fig. 2. Fig. 4^a is a sectional detail of Fig. 4. Fig. 5 is a detail of a collar. Fig. 6 is a detail of a ring, and Fig. 7 is a sectional detail of a crank-operating device.

In the accompanying drawings, in which similar numerals of reference indicate corresponding parts in the several views, the numeral 1 indicates a portion of the base of a machine or stand, which may be of suitable construction.

2 is a suitably-shaped head-stock or frame secured upon the base 1 and provided with bearings 3, in which is journaled a suitably-shaped spindle 4. (See dotted lines in Fig 2.) At the inner end of the spindle 4 is suitably secured a gear-wheel 5, to which a face-plate 6 or other moving part may be removably attached by any desired means. In Fig. 1^a the face-plate 6 is shown provided with a rim or ledge 6^a, which rests against or supports the web 5^a of the gear-wheel 5, screws or bolts 5^b holding said parts together. The face-plate 6 has a threaded bore 6^b to engage corresponding threads on the spindle 4. By this means different-sized gears 5 may be attached to the face-plate 6, and the latter is detachable from the spindle 4. Upon the spindle 4, between the bearings 3, is loosely mounted a cone-pulley 7, which may turn independently of said spindle. At the opposite ends of the pulley 7 are suitably secured gear-wheels 8 9, one of greater diameter than the other, as shown in Fig. 2.

Upon the spindle 4 and within the pulley 7 is suitably secured a rim, ring or casting 10, which is adapted to be connected with the gear-wheel 8 or the pulley 7, when desired, to enable the pulley to drive the spindle 4 directly. For this purpose I have shown the part 11 in the form of a collar or casting carrying the rim or ring 10. The rim or ring 10 is provided, as shown, with one or more recesses or slots 12, into which may be inserted a bolt 13, shown carried by the gear-wheel 8.

The web of the wheel 8 is shown provided with a slot 14, in which the bolt 13 fits, said slot being sufficiently long to enable the bolt 13 to be held at one side of, or out of line with, the ring or rim 10, and to enable the bolt to be inserted into a recess 12. The bolt 13 has a head sufficiently large to prevent it from being pulled through the slot 14, and it is also provided with a thumb-nut 15 threaded on the bolt, by which the bolt may be held tight against the web of the wheel 8, a plate or washer 16 being placed between said nut and the wheel 8. (See Fig. 2.) In the position shown in Fig. 2 the pulley 7 can turn freely on the spindle 4; but when the bolt 13 is placed in a recess 12 of the ring or rim 10 the rotation of the pulley 7 will turn the spindle 4 and face-plate 6 at a speed equal to the rotation of the pulley.

17 is a shaft extending parallel to the spindle 4, preferably on a plane horizontal therewith, and journaled in suitable bearings 18 carried by the head-stock or frame 2, the spindle 4 and shaft 17 being at a suitable distance apart. The shaft 17 carries two gear-wheels 19 and 20 adapted to mesh with the wheels 8 9, respectively. (See Fig. 2.) The wheels 19 and 20 are loosely mounted on the shaft 17, so that the latter can turn independently of said wheels, and said wheels are arranged to be connected with said shaft by frictional devices, so that either of said wheels

can turn said shaft through the medium of wheels 8 9 and pulley 7. The wheels 19 and 20 are shown provided with hubs or sleeves 19^a 20^a, respectively, which are loosely mounted on the shaft 17, so as to have longitudinal movement thereon. The wheels 19 and 20 are shown connected with the hubs 19^a 20^a by spokes 21 22. The wheels 19 20 have interior beveled faces 23 24, respectively, forming friction-surfaces. The faces 23 24 are adapted to make frictional contact with the beveled faces 25 26 of friction rims or wheels 27 28, which are rigidly secured to the shaft 17 by suitable means. The friction rims or wheels 27 28 are shown passing within the wheels 19 20, and when the surfaces 23 25 or 26 24 are pressed together the wheel 19 or 20 will be caused to turn the corresponding part 27 or 28, and to thus turn the shaft 17. The shaft 17 carries a pinion 29 that is adapted to mesh with the gear-wheel 5, so that when the shaft 17 is turned motion will be communicated by the pinion 29 to the gear-wheel 5, and thus to the face-plate or moving part 6. The rims or wheels 27 28 are shown provided with spokes 30 31 connected with hubs 32 33, which are fastened upon the shaft 17 by suitable means.

The gear-wheels 19 and 20 are to be brought into contact with the rims or wheels 27 28 when it is desired to turn the shaft 17 by either of said gear-wheels, according to the speed desired, and to conveniently provide for causing frictional contact between the surfaces 23 25 or 26 24 I have shown means for moving the wheels 19 and 20 toward the rims or wheels 27 28. For this purpose I have shown collars 34 35 loosely mounted upon the shaft 17 and bearing against the hubs 19^a 20^a, respectively. The collars 34 35 have pairs of ears 34^a 35^a on opposite sides, in which are pivoted levers 36 37. The levers 36 37 have inwardly-extending toes or offsets 38, that are arranged to bear against rings 39 rigidly carried by the shaft 17, so that when the levers 36 or 37 are moved outwardly the toes 38 will bear against the respective ring 39, and thereby move the collar 34 or 35 along the shaft 17, pressing it against the hub 19^a or 20^a, and thus forcing the friction-surfaces 23 and 25 or 24 and 26 together to bind the wheels 19 and 27 or 20 and 28 together frictionally.

The rings 39 are adjustable along the shaft 17, and for this purpose are provided with interior threads to engage corresponding threads on the shaft 17, as indicated by dotted lines 40 in Fig. 2. In order to firmly clamp the rings 39 upon the shaft 17 after they are adjusted to the proper position said rings are preferably split and held together by screws 41 (see Fig. 6) which act to bind said rings upon the shaft 17. With this construction, when wear takes place between the friction-surfaces 23 25 or 24 26 and between 39 34 19^a or 39, 35 and 20^a, the rings 39 can be adjusted along the shaft 17 to cause the toes 38 to have proper action at all times in producing frictional contact between the surfaces 23 25 and 24 26.

The surfaces 23 25 and 24 26 are normally held out of contact, and for this purpose I place between the wheels 19 27 and 20 28 a suitably-shaped spring 19^x, which tends to press said wheels apart. (See Fig. 2^a.)

To operate the levers 36 37 to produce frictional contact between the parts 19 27 and 20 28, I provide a spool or sleeve 42, which is loosely mounted on the shaft 17 and located between the ends of the levers 36 37. The spool or sleeve 42 is of such a diameter that when pressed between the levers 36 37 it will spread said levers apart to cause their toes 38 to bear against the corresponding collar 39, and thus move the wheel 19 or 20 toward the wheel or rim 27 or 28. To slide the spool or sleeve 42 along the shaft 17 said spool or sleeve is shown provided with a central annular groove 43, which receives a fork 44 or the like carried by a sliding arm 45. The arm 45 is shown mounted to slide on a rod 46 carried by a support 47 secured on the head-stock or frame 2, as by screws 48. The arm 45 is moved along the rod 46 by a crank 49 carried by a rock-shaft 50 journaled in bearings 51 on the head-stock or frame 2 and provided with a lever or crank-handle 52. The crank 49 has a loose connection with the arm 45 to compensate for the different movements between said parts and to permit of the outward movement of the arm 45, as hereinafter explained. For this purpose the arm 45 is provided with lugs 45^a, having a space between said lugs in which is movably fitted a block 45^c, said block receiving a pin 45^d carried by the crank 49. By this means the crank 49 can move the arm 45 along the rod 46, and said arm can move outwardly from said crank.

With the above described devices, when the parts 20 28 are in engagement, the shaft 17 will be turned by the pinion 9 and wheel 20 at a speed commensurate with the ratio between said pinion and wheel, and thus through the pinion 29 the wheel 5 will be turned at a certain speed. The wheel 19 will now turn idly. When the parts 19 and 27 are in engagement the shaft 17 will be turned by the gear-wheels 8 and 19 at a speed proportional to the ratio between said wheel, and thus wheel 5 will be turned at a greater speed than by pinion 9 and wheel 20. Thus while the pulley 7 is rotating the spool or sleeve 42 can be moved to cause the shaft 17 to be turned either by the wheel 19 or wheel 20, or vice versa, as desired, whereby the speed of wheel 5 can be changed without stopping.

When the wheel 5 is to be turned by the pulley 7 directly through the medium of spindle 4 and parts 8 10 13, as before explained, the gears 5 29, 8 19 and 9 20 are to be disengaged, and this can be done by moving the shaft 17 outwardly. For this purpose I have

provided bushings or sleeves 55, that are located in the bearings 18, the shaft 17 being located in eccentric bores 56 in said bushings or sleeves. (See Figs. 4 and 4ª.) The bushings 55 have arms or levers 57 connected with them, which arms or levers are connected by a tie-rod or handle 58, whereby said arms or levers can be moved together. By this means when the arms or levers 57 are in, say, the upper position (see Figs. 1 and 3) the gears 5 29, 8 19 and 9 20, respectively, will be in mesh; but when the arms 57 are thrown down the bushings will be turned and the eccentric bores 56 will be moved outwardly, thus carrying the shaft 17 to one side and disengaging said gears. Thus it will be seen that the pulley 7 can drive the gear 5 and face-plate 6 at many different speeds, according to the way the gears are caused to mesh.

It will be understood that the gears 5 and 29 can be interchangeable and of different sizes, as desired, in order to vary the relation of speed between the shaft 17 and gear 5.

Having now described my invention, what I claim is—

1. The combination of a driving part having gears connected with it, with a face-plate having a gear, gears to mesh with the first-mentioned gears, a gear to turn the face-plate gear, a shaft therefor, said gear being removably connected with said shaft, and frictional devices to cause the third-mentioned gears to turn when respectively driven by the driving part, substantially as described.

2. In a changeable-speed gearing, the combination of a driving part having gears connected with it, with a shaft, gears mounted loosely on said shaft, frictional devices to connect said gears with said shaft, and means to operate said devices to cause either of said sets of gears to turn said shaft, a gear 29 carried by said shaft and removably connected therewith, and a face-plate having a gear-wheel 5 to mesh with the gear 29, substantially as described.

3. In a changeable-speed gearing, the combination of a spindle carrying a removable gear 5, a pulley loosely mounted on said spindle and gears connected with said pulley, with a shaft carrying a removable gear-wheel to mesh with the gear 5, gears loosely carried by said shaft and adapted to mesh with the gears connected with the pulley, and means to connect either of said gears with said shaft, substantially as described.

4. The combination of a spindle, a removable gear 5, carried thereby, a pulley loosely mounted on said spindle, means to connect said pulley with said spindle, and gears connected with said pulley, with a shaft, a removable gear carried by said shaft for turning the gear 5, gears loosely mounted on said shaft to mesh with the first-mentioned gears, and means to connect either of said second-mentioned gears with said shaft, and means for moving said gears into and out of mesh respectively, substantially as described.

5. The combination of a spindle, a pulley having gears at opposite ends and loosely mounted thereon, a rim or ring 10 located within the pulley and having a collar or casting 11 secured to said spindle, said rim or ring having one or more notches 12, and a bolt supported by said pulley and arranged to be inserted into one of said notches to connect said pulley with said spindle, another spindle, gears carried thereby and frictional devices to connect said gears with said spindle separately, substantially as described.

6. The combination of a pulley having gears at opposite ends, with a shaft, gears loosely mounted thereon friction rims or wheels secured to said shaft to engage said gears, means for moving said gears on said shaft to make frictional connection with said wheels or rims, a gear 29 removably carried by said shaft, and a face-plate carrying a gear-wheel meshing with said gear 29, substantially as described.

7. The combination of a pulley having gears at opposite ends, with a shaft, gear-wheels loose thereon, frictional devices to connect said shaft operatively with said gear-wheels, collars loose on said shaft to move said gear-wheels along the shaft, levers pivotally carried by said collars and having toes or extensions 38, divided rings threaded on said shaft and having screws to bind them on the shaft, a spool or sleeve on said shaft to operate said levers and means to operate said spool or sleeve, a gear 29 on said shaft, and a face-plate having a gear-wheel to mesh with said gear 29, substantially as described.

8. The combination of a spindle, a gear 5, a face-plate carried thereby, and a pulley having gears at opposite ends, with a shaft having a gear 29 to mesh with the gear 5, gear-wheels loose on said shaft to mesh with the gears connected with said pulley, frictional devices to connect said gear-wheels with said shaft, levers carried by said shaft to move said gear-wheels laterally to cause the friction devices to connect said gear-wheels with said shaft, a spool or sleeve to operate said levers, an arm to move said spool or sleeve, and means to operate said arm, substantially as described.

9. The combination of a pulley having gears, with a shaft, gear-wheels loosely mounted thereon, frictional devices to connect said wheels with said shaft, levers and a spool to operate said friction devices, an arm to operate said spool, a rock-shaft having a crank to operate said arm, said crank and arm having a movable connection, supports for said shaft, bushings in said supports, said bushings having eccentric bores to receive said shaft, and arms connected with said bushings to turn them, as and for the purposes specified.

10. The combination of a shaft, wheels loose thereon friction devices to connect said wheels

with said shaft, levers to operate said devices, a spool or sleeve to operate said levers, an arm mounted to slide on a rod suitably held, said arm being connected with said spool to slide it on said shaft, said arm having a recessed extension or lug, a block movably fitted therein, a crank having a pin to fit said block, a rock-shaft carrying said crank, supports for said shaft, an eccentric bearing for said first-mentioned shaft, and means to turn said bearings to move said shaft sidewise, substantially as described.

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Witnesses:
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