B. Arnold,

Turning Regular Forms.

No. 6,821. Patented Oct. 30, 1849.

Fig: 1.

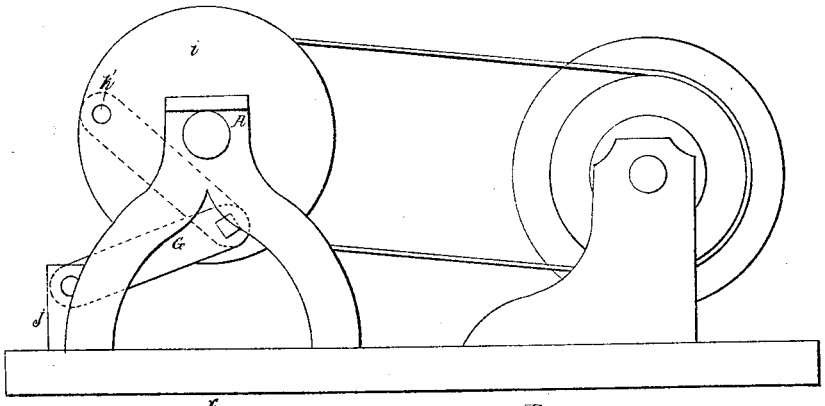


Fig: 2.

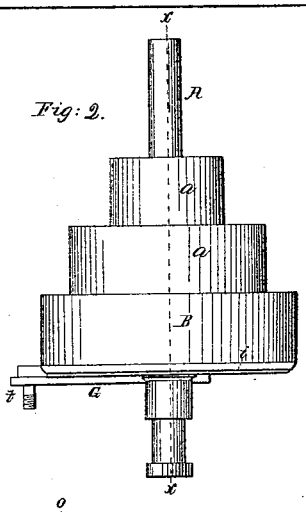


Fig: 4.

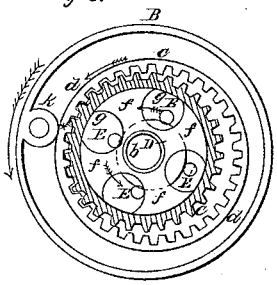


Fig: 8.

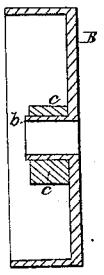


Fig: 3.

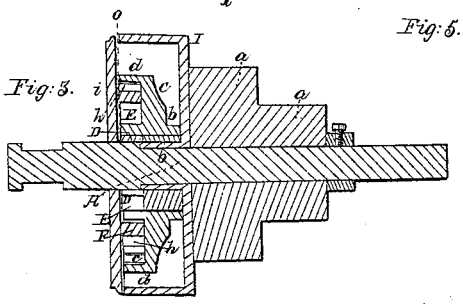


Fig: 5.

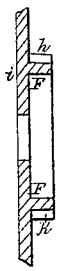
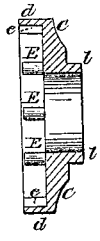


Fig: 6.

Fig: 7.



UNITED STATES PATENT OFFICE.

BENJ. ARNOLD, OF EAST GREENWICH, RHODE ISLAND.

GEARING.

Specification of Letters Patent No. 6,821, dated October 30, 1849.

To all whom it may concern:

Be it known that I, BENJAMIN ARNOLD, of East Greenwich, in the county of Kent and State of Rhode Island, have invented a new and useful Improvement in Double Gearing for Lathes or Turning-Engines, which is described as follows, reference being had to the annexed drawings of the same, making part of this specification.

Figure 1, is an elevation of the large pulley of the improved gearing and a series of pulleys to which it is connected by an endless band. Fig. 2, is a top view of the pulleys and arbor or shaft upon which they turn loosely. Fig. 3, is a vertical section of the gearing at the line *x x* of Fig. 2. Fig. 4, is a vertical section of ditto at the line *o o* of Fig. 3. Fig. 5, is a vertical section of the detached face plate and cogged ring attached. Fig. 6, is a section of the hub inclosed within the cogged ring. Fig. 7, is a section of the flanged cogged wheel. Fig. 8, is a section of the main or hollow pulley in which the gearing is inclosed and eccentric attached to the same.

Similar letters in the figures refer to corresponding parts.

The nature of this invention and improvement consists in making the large or main pulley on the shaft or arbor of the lathe or engine, hollow, and arranging within the same cogged and eccentric gearing of such construction and arrangement as will either cause said arbor or shaft to turn with a much lower motion than the pulleys, with a corresponding increase of power, or revolve at the same speed as the pulleys, at the option of the operator, thus dispensing with the ordinary complicated gearing, and the many disadvantages attending the same, and forming a simple and effective gearing, inclosed within the main pulley, and not therefore liable to become entangled with the band, or to catch the hands, or otherwise injure persons working at the lathe.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the main shaft or arbor of the lathe or turning engine, sustained and turning in suitable boxes elevated above the table or platform in the usual manner, and provided with the ordinary pulleys *a*, of unequal sizes, turning loosely on the same.

B is the main metallic or large pulley, made hollow, and secured to, and turning loosely on the shaft with the smaller pulleys, and having a hub, or cylinder *b*, cast at its center, concentric with its periphery, surrounded by a circular block of steel *c*, arranged eccentric with its center, and secured to the inside face of the pulley by screws or otherwise.

C is a metallic wheel perforated with a circular opening at center, and having a hub or cylinder *l*, on its left hand face at that provided with a circular projection or flange *d*, at its periphery on the inner surface of which is found a series of cogs *e* as represented in Figs. 3, 4 and 7. The opening in the center of this wheel is faced with steel, and fits over the eccentric *c*, which revolves within the same.

D is a metallic hub keyed firmly to the main shaft and provided with four arms *f* arranged at equal distances apart, and curved or made convex at their outer ends so as to exactly fit inside the cogged ring F, and curved or made concave on their sides, so as to form circular spaces *g*, between them.

E are four pins or bolts prejecting from the right hand face of the metallic wheel, at equal distances apart, and immediately next the circular opening in the same, as far as the face of the hub, and through the circular spaces between the arms of the same.

F is a circular metallic ring, made smooth on its inner periphery in order to fit the periphery of the arms *f* of the hub D which turn within the same, and having cogs *h*, on its periphery, which mesh in gear with the cogs *e*, on the under periphery of the projecting edge *d*, of the larger wheel C, and secured to the inside of the detached face plate *i*, of the large pulley B by means of screw bolts or otherwise.

G is a connecting rod or plate, secured to the outside of the detached face plate of the pulley, at one end, and to the head stock *j* at the opposite end, by means of a pin or screw bolt, when the lathe is used as a double geared lathe, to hold the face plate *i*, and the circular cogged ring F, stationary during the revolution of the pulleys.

The remaining parts of the lathe are made and operated in the usual manner.

The operation of this gearing is as follows—Motion being communicated to the pulleys by means of the usual band, the eccentric *c*, secured on the inner face of the large or main band wheel B, and turning

within the opening in the center of the cog wheel C, will cause said cog wheel C to revolve around the stationary circular cogged ring F, which is secured to the detached face plate *i*, of the pulley, and held stationary by the connecting rod or plate G, and to which the large wheel C is geared by the cogs on the under periphery of the projecting edge *d*, with a speed proportionate with the relative number of cogs on the respective wheels; — for instance, if the larger wheel C has 60 cogs on its inner periphery, and the smaller stationary wheel F, has 59, the eccentric *c*, will make 60 revolutions, while the larger wheel C, will be making one revolution, and if the larger wheel has 32 cogs, and the inner wheel or ring F 28 the eccentric will make 8 revolutions, while the wheel C is making one,—and so on in this ratio;—the wheel C going around the stationary cogged ring F, just so many teeth as it has more than said cogged ring, at each revolution of the eccentric. The motion of pins or bolts E, being also eccentric to the center of the main shaft or arbor A, will alternately strike the curved or concave sides of the arms *f*, of the hub D, during their revolution, and cause them to revolve with a decreased speed, and carry with them the main shaft or arbor to which they are keyed—thus forming a simple and effective gearing, between the pulleys and main shaft, by which a decreased speed, and a corresponding increase of power is given to the shaft, inclosed within the large pulley B, out of the reach of dust, and the way of the person operating at the lathe.

Should the larger wheel C have 32 cogs and the smaller wheel or ring F have 29 cogs, as represented in the drawings at Fig. 4 the eccentric *c* at one revolution will cause the cog marked * on the large wheel C immediately on a line with the center of the eccentric and the center of the main shaft as indicated by a dotted line in the drawing to withdraw itself from between the cogs marked * * of the smaller wheel or ring F and advance over the three intervening cogs and enter between the cogs * * of said small wheel or ring F and said eccentric will at each succeeding revolution cause said cog * of the larger wheel to skip or move over a similar number (3) of cogs on the ring; and there being 29 cogs on the smaller wheel or ring F the eccentric *c* will revolve a fraction less than ten times to every one revolution of the larger wheel C—the pins E projecting from the right hand face of said larger wheel C will form a circuit within the spaces between the arms *f* of the hub D and by their action on the curved sides of said arms *f* will cause the hub D and shaft A to which it is firmly keyed to make one revolution to every revolution of the larger wheel C.

When it is desired to run the lathe or turning engine with single gear, the lower end of the connecting rod or plate G, is detached from the head stock *j*, and is turned over so as to bring the opening in the same, opposite the opening K, in the detached face plate *i*, and an opening in a projection *k* cast on the inner periphery of the large pulley, and the screw bolt *t*, is screwed into the same, which will secure the connecting rod or plate G, and detached face plate *i* to the pulleys, and cause them to revolve with the pulleys, and the shaft or arbor to turn without any diminution of power or speed.

What I claim as my invention and desire to secure by Letters Patent is—

The mode of transmitting motion from the pulleys of a double geared lathe, or turning engine, to the main shaft or arbor A, of the same, with a decreased speed and a corresponding increase of power, by means of the eccentric *c*, secured on the inside of the large hollow pulley B, and turning within the large wheel C, arranged eccentric with the shaft, and having cogs *e*, on the inner periphery of the projection *d*, at its outer edge, meshing in gear with a circular cogged ring F, secured to the inner surface of the detached face plate *i*, and held stationary by the connecting rod or plate G and also the hub D keyed to the shaft or arbor A, having arms *f*, made convex on their extremities, and concave on their sides, so as to form circular openings *g*, or spaces, when inserted in their places, in which the bolts or pins E, revolve in their passage around the axle or arbor, alternately striking the concave sides of the arms and causing them to revolve slowly,—in such a manner as to cause the large cog wheel C, to revolve around the cogged ring F just so many cogs as it possesses more than said ring, at every revolution of the eccentric *c*, and a proportionate slow speed to be given to the shaft or arbor A, as herein set forth or in any other mode substantially the same.

In testimony whereof I have hereunto affixed my hand and seal this the fifth day of Sept. 1849.

BENJAMIN ARNOLD.

Witnesses:

JAMES G. ARNOLD,

WM. D. ARNOLD.