No. 734,897. PATENTED JULY 28, 1903.

A. B. LANDIS.

AUTOMATIC GRINDING MACHINE.

APPLICATION FILED APR. 17, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

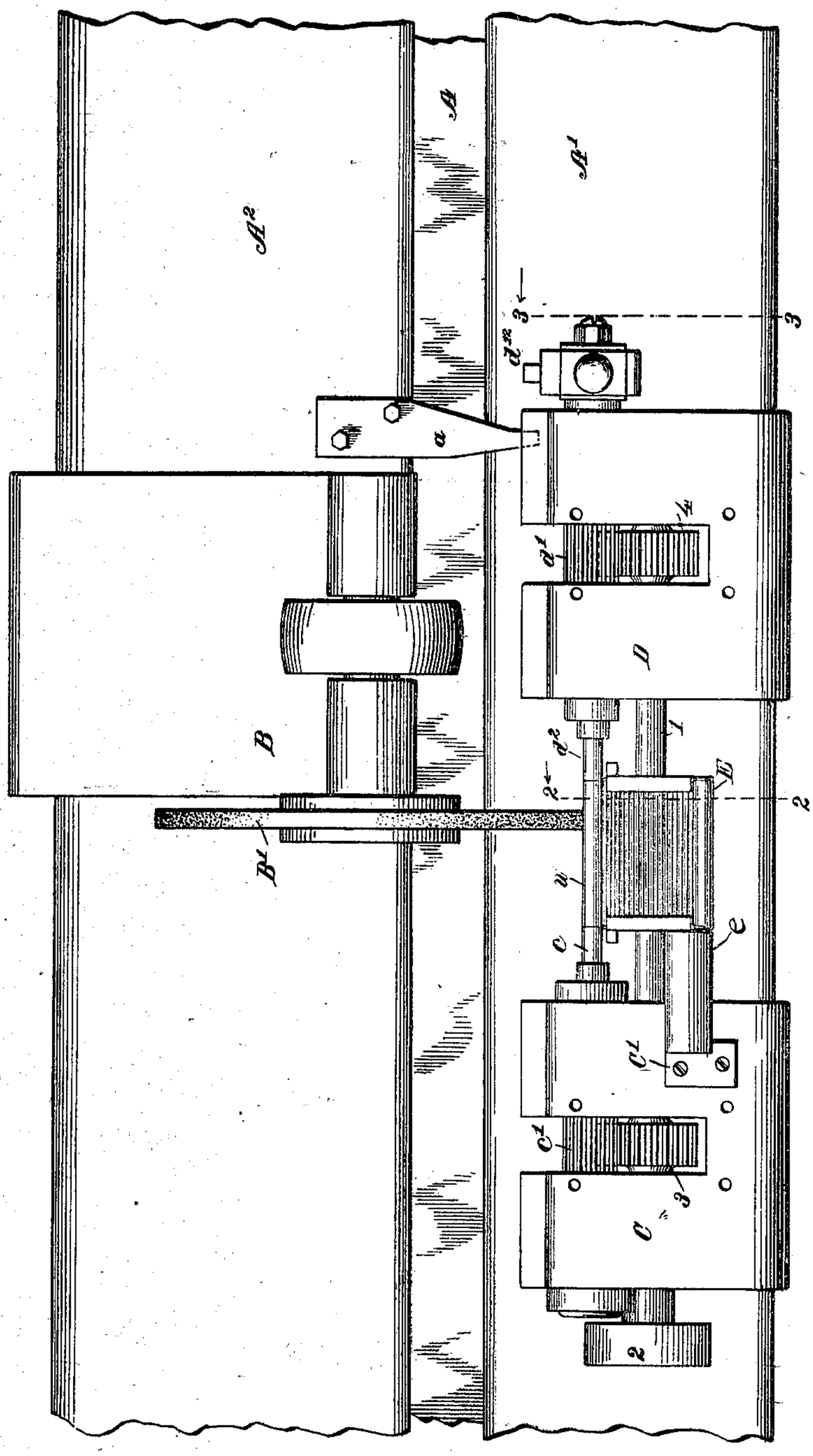

Fig. 1.

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NO MODEL. 3 SHEETS—SHEET 2.

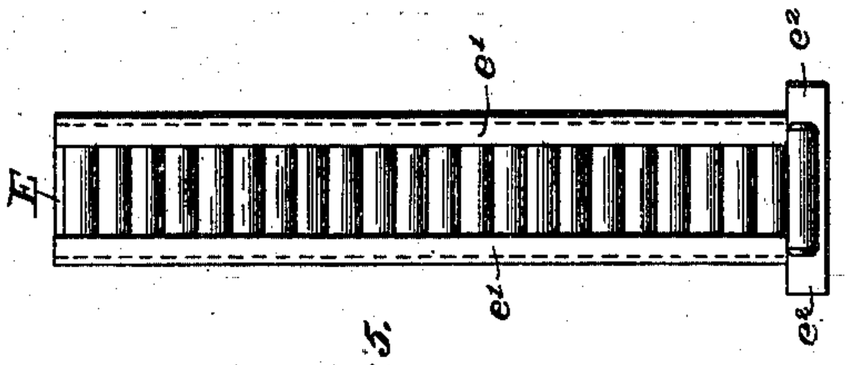

Fig. 5.

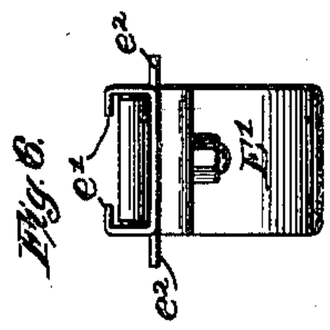

Fig. 6.

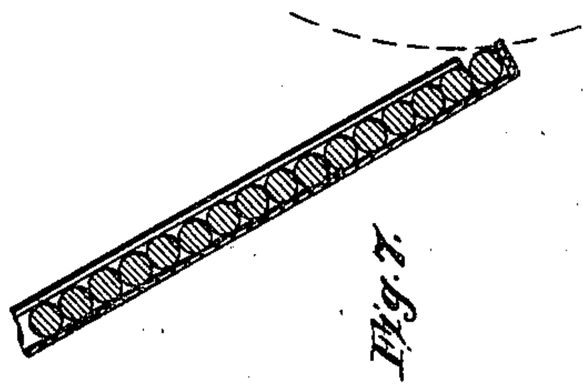

Fig. 7.

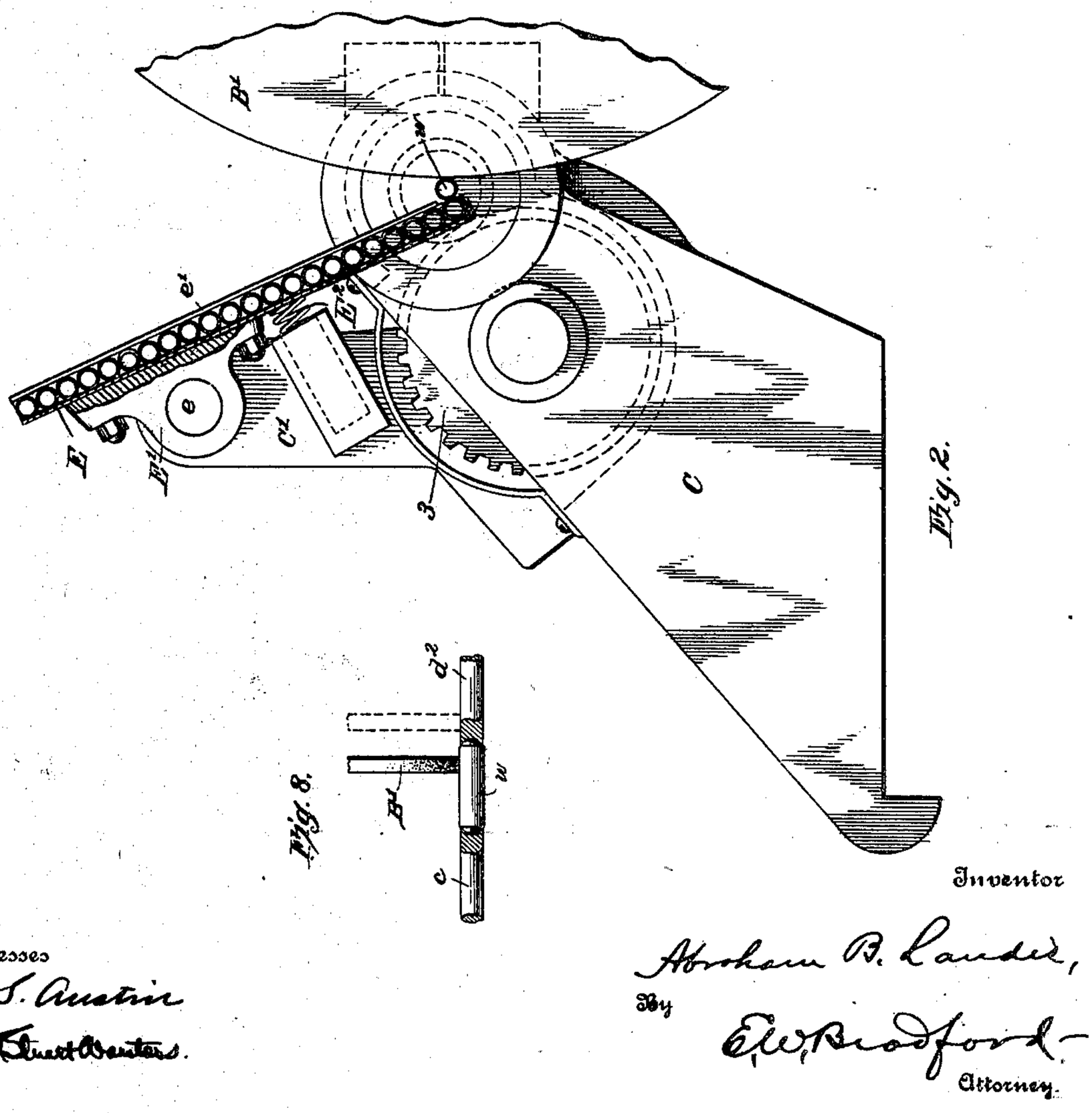

Fig. 2.

Fig. 8.

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AUTOMATIC GRINDING MACHINE.

APPLICATION FILED APR. 17, 1902.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3.

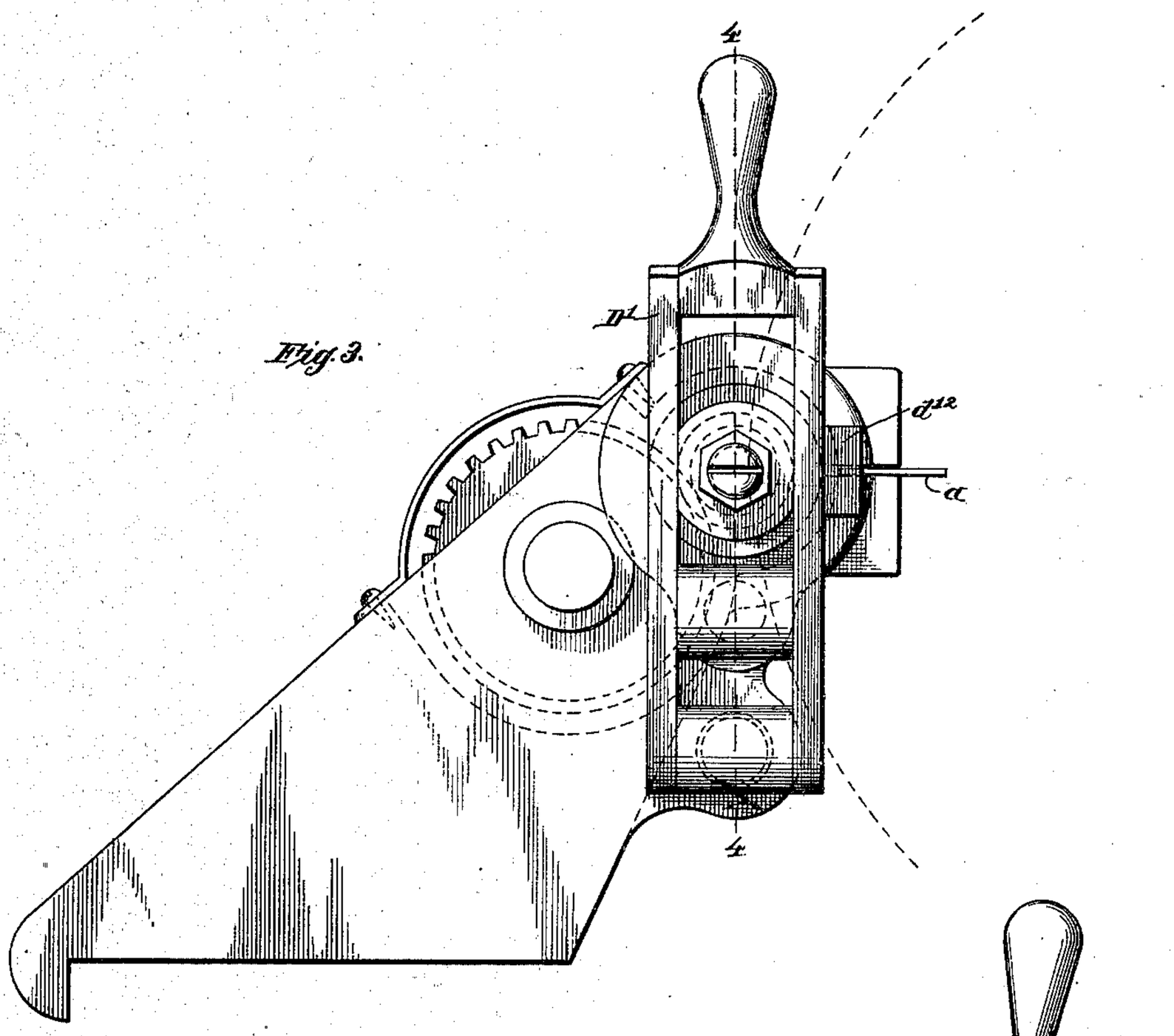
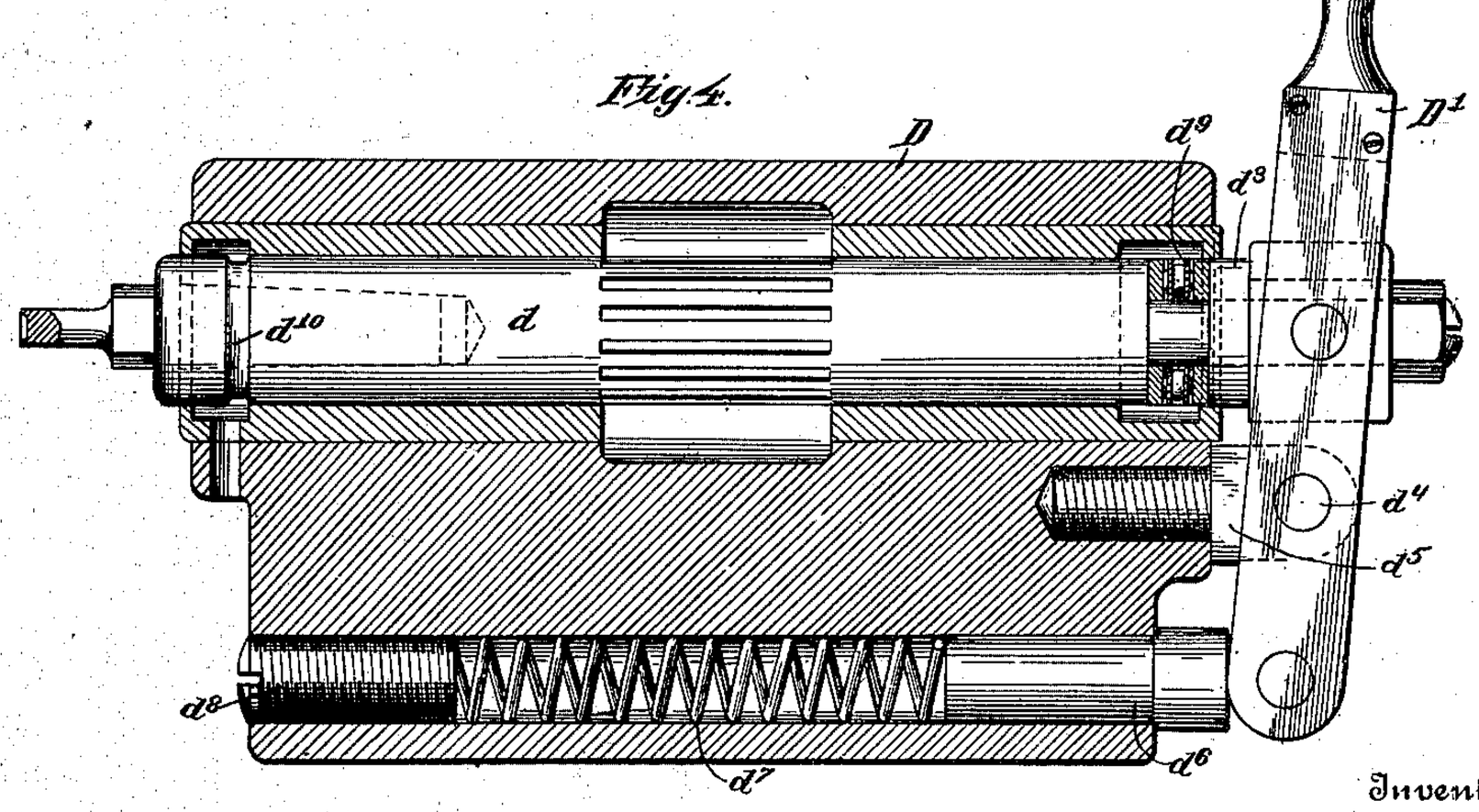


Fig. 4.



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No. 734,897. Patented July 28, 1903.

UNITED STATES PATENT OFFICE.

ABRAHAM B. LANDIS, OF WAYNESBORO, PENNSYLVANIA.

AUTOMATIC GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 734,897, dated July 28, 1903.

Application filed April 17, 1902. Serial No. 103,316. (No model.)

To all whom it may concern:

Be it known that I, ABRAHAM B. LANDIS, a citizen of the United States, residing at Waynesboro, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Grinding-Machines, of which the following is a specification.

The object of my said invention is to provide an attachment for grinding-machines of that general construction shown in Letters Patent heretofore granted to me or any other approved construction whereby the work may be fed to the machine and released therefrom automatically, thus saving the labor and expense in attending the machine and increasing its capacity for turning out the work.

It relates more particularly to an arrangement for grinding short cylindrical parts—such as rolls for roller-bearings, pins, and short shafts of various kinds—which require but little grinding and may by use of my attachment be passed through the machine and given a ground finish very rapidly.

Said invention consists in various improvements in the construction and arrangement of parts whereby these objects are accomplished, as will be hereinafter more fully described and claimed.

Referring to the accompanying drawings, which are made a part hereof, and on which similar reference characters indicate similar parts, Figure 1 is a top or plan view of the grinding-machine bed with the parts mounted thereon which relate to my present invention; Fig. 2, a cross-section looking in the direction indicated by the arrows from the dotted line 2 2 in Fig. 1; Fig. 3, an end view of the foot-stock as seen when looking in the direction indicated by the arrows from the dotted line 3 3 in Fig. 1; Fig. 4, a longitudinal section through said foot-stock on the dotted line 4 4 in Fig. 3, the operating-lever and interior parts being shown in whole lines; Figs. 5, 6, and 7, different views of the work-holding magazine separately; and Fig. 8, a view showing the work clamped between the work-holding centers in the position it occupies while being ground, the position of the grinding-wheel just before the operation of grinding begins being indicated by dotted lines.

In said drawings the portions marked A represent the bed of the machine; B, the grinding-wheel base; C, the head-stock; D, the foot-stock, and E the work-holding magazine.

The bed A and the grinding-wheel base B, having the grinding-wheel B′ mounted thereon, are of a common or well-known construction or may be of any suitable or approved construction and need no special description herein.

The head-stock C is a casting of suitable form mounted on the top of the table A′ on the bed A in the usual or any approved manner. It is formed with a central opening and has a work-holding center *c*, mounted in the end of a spindle, which is mounted in bearings in said head-stock and extends across said open space. The driving-shaft 1, provided with a pulley 2, by which it is connected with the driving power, is mounted in bearings in said head-stock and extends parallel with the spindle carrying said work-holding center. It also extends across and is likewise journaled in similar bearings in the foot-stock D. Said foot-stock D is of a form similar to the head-stock C and has a similar spindle *d*, journaled in a longitudinal bearing extending through one side thereof. Said spindle has a cogged gear *d′* on its center extending across the central open space in said foot-stock. A gear-wheel 3 on the driving-shaft 1 meshes with the gear-wheel *c′*, and a gear-wheel 4 on said driving-shaft meshes with the gear-wheel *d′*. The work-holding center d^2 of the foot-stock is mounted in a socket in the inner end of the spindle *d* in a similar manner as is the work-holding center *c* mounted in the head-stock spindle. The outer adjacent faces of said work-holding centers are preferably formed somewhat concave or cupped, as shown most plainly in Figs. 4 and 8, for the purpose to be presently described. The spindle *d* in the foot-stock D is mounted to be longitudinally adjusted and is connected, by means of a sleeve d^3, mounted on a projecting outer end, to a lever D′, which is pivoted on a pivot d^4 on a stud d^5, projecting from the end of said foot-

stock, and the lower end of said lever extends below said pivot and bears against the outer end of a sliding pin d^6, mounted in a longitudinal aperture in said foot-stock below said pivot, which pin is held and forced outwardly against the lower end of said lever by means of a spring d^7. The opposite end of said aperture containing said pin is preferably filled by a screw-plug d^8, by the adjustment of which the tension of said spring may be regulated. The sleeve d^3 is thus normally forced against the end of the spindle d, an antifriction ball-collar d^9 being preferably interposed between said sleeve d^3 and a shoulder in said spindle. A groove d^{10} is formed around the opposite end of the spindle d within a surrounding cavity in the bearing, and an aperture d^{11} leads from said cavity through the bearing and a portion of the head-stock to permit the discharge of any water or grit which may get within said cavity, preventing the same from passing into the bearing proper. A wing d^{12} is formed on the side of the lever D′ above the pivot d^4 and in the path of a trip-bar a, which is secured to a suitable part of the traveling carriage A^2, on which the grinding-wheel is mounted in position to contact with said wing and throw said lever to withdraw the holding-center d^2 from the work sufficiently to release it when the grinding-wheel has traversed its length, as will be presently more fully described. The cogs of the gear d' are formed of sufficient length to permit this movement without disengaging it from any portion of the gear-wheel 4.

The work-holding magazine E is of a suitable form to contain a large number of parts to be ground and is provided on its rear side near its top with a projecting bracket E′, containing a pivot-bearing by which it is mounted on a pivot e on the top of a standard C′, secured to the top of the head-stock C and extending up therefrom to the proper height. The magazine is of a width to accommodate the work desired and has overhanging edges e', which hold the work from falling out until released at the proper discharge-point. At its lower end it is formed with laterally-projecting wings e^2 and has an opening through the overhanging edges e' of sufficient width to permit of the discharge of one piece of work. A spring E^2, suitably mounted in a bracket behind said magazine beneath its pivot, bears against its rear side and normally holds the lower end thereof forward against the work in the work-holding centers or against said centers after the discharge of one piece of work until the next piece is supported by said centers. The work is fed into the top of the magazine by hand or in any approved manner.

The operation of my said invention is as follows: The attachment being mounted on a grinding-machine and the magazine filled with parts to be ground, as shown in Fig. 2, the grinding-wheel before the work starts will normally stand as indicated by dotted lines in Fig. 8, its face just escaping the surface of the projecting end of the work-holding centers. As the machine starts in operation the carriage A^2, with the grinding-wheel mounted thereon, carries said grinding-wheel across the length of the work, which is positively driven through the work-holding centers, which are positively geared to the driving-shaft 1, as before described. The carriage-operating mechanism being adjusted to drive the same a distance corresponding with the length of the work and back, the wheel traverses said work in both directions, and at the limit of the return movement as the grinding-wheel passes the work the trip-bar a comes into contact with the wing d^{12} of the lever d', throwing said lever and through it drawing back the spindle d and the work-holding center d^2, thus releasing the work w and permitting it to fall to beneath the machine into a suitable receptacle or carrying-off mechanism provided therefor. As said work falls from the work-centers the spring E′ throws the magazine forward, the projecting wings e^2 coming against the rear surfaces of the work-holding centers c d^2, the piece of work in the bottom of the magazine being thus brought into line with said centers. The ends of the work being slightly tapered and the ends of the work-holding centers being cup-shaped, when the carriage starts upon its return movement, permitting the spring d^7 through the connections before described to throw the center d^2 forward, said ends of the work are at once clamped between said centers and held by frictional contact to revolve therewith. As soon as the said piece of work begins to revolve the weight of the other pieces of work in the magazine tends to press down behind it, and it quickly assumes the position shown in Fig. 2. The lower piece of work in the magazine being thus held against the revolving work serves as a steady rest therefor and at the same time is in a position to drop quickly between the work-holding centers when the piece in front shall fall from the machine. By this arrangement, the magazine being filled, the machine may be started into operation and will operate automatically to grind and finish a large number of parts with very little attention. It is obvious that the invention is quickly adaptable for use on a grinding-machine where the work travels instead of the grinding-wheel.

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

1. In a grinding-machine, the combination of the positively-driven work-holding centers, a spring-held pivoted magazine for holding the work and feeding the same automatically to said work-holding centers, and means for au-

tomatically releasing and clamping said work in said centers, substantially as set forth.

2. In a grinding-machine, the combination of the work-holding centers, means for driving the same, a spring-held pivoted magazine for holding the work and for conducting the same to said work-holding centers, means for releasing the work when finished, and means for automatically placing another piece of work between said work-holding centers as each piece is successively released, substantially as set forth.

3. In a grinding-machine, the combination of the work-holding centers geared to be positively driven, one of said centers being mounted to move longitudinally, a lever for controlling its movements, means for normally holding it in position to clamp the work, the trip-bar for contacting with said lever and automatically moving it to release said work when the operation is completed, and a magazine mounted to feed the parts to be ground to said work-holding centers, substantially as set forth.

4. In a grinding-machine, the combination of the work-holding centers, formed with cup-shaped holding ends, and with exterior surfaces corresponding with and in line with the surface of the work to be ground, whereby said work may be ground over its entire surface from end to end, and the wheel pass therefrom over one of said work-holding centers as said work is released and another piece received, substantially as set forth.

5. In a grinding-machine, the combination of the work-holding centers formed with cup-shaped holding ends, a pivoted magazine for holding the parts to be ground and feeding them to said holding-centers, said magazine being formed with an opening at its lower end to discharge one piece of work, and having laterally-projecting wings adapted to contact with said work-holding centers as each piece of work is released, and thus bring the next piece of work into position between the said work-holding centers to be clamped thereby, and means for automatically clamping and releasing said parts, substantially as set forth.

6. In a grinding-machine, the combination of the work-holding centers, a pivoted magazine for holding and feeding the parts of the work to the said work-holding centers, the lower end of said magazine being adjacent to said centers, and formed with an opening of a size to discharge one piece of work at a time, the spring for normally holding the said magazine toward said centers, laterally-projecting wings adapted to contact with said centers when the magazine is moved forward, and thus bring the piece of work in the bottom of the magazine in line between said centers, and means for releasing and for clamping said work, substantially as set forth.

7. In a grinding-machine, the combination of the work-holding centers, a magazine for containing the parts to be ground, said magazine being pivoted and its lower end being normally held toward said work-holding centers and formed with an aperture to permit the discharge of one part at a time, means for limiting the movement of said lower end to bring the work in line between said work-holding centers, and means for receiving and releasing said work, substantially as set forth.

8. In a grinding-machine, the combination of the work-holding centers mounted to be positively driven, one of said centers being normally held against the work by a yielding pressure, a yieldingly-held pivoted magazine for feeding the work automatically to said work-holding centers, and means for automatically moving said movable center to release said work, substantially as set forth.

9. In a grinding-machine, the combination of the work-holding centers, one of which is mounted to move longitudinally, a sleeve mounted on the outer end of the spindle, of said center, a pivoted lever, connected thereto, a sliding pin, yieldingly held against the opposite end to hold said spindle forward, a trip-bar located on the traveling part and adapted to contact with said lever and throw said center to release the work at the proper point, and means for feeding the work to the machine, substantially as set forth.

10. In a grinding-machine, the combination of the head and foot stock provided with positively-drawn spindles, holding-centers mounted in said spindles, one of said spindles being mounted to move longitudinally, a spring for holding the said spindle to the work through a pivoted arm or lever, and means for actuating said spindles oppositely from the action of the spring by the motion of the carriage, and means for feeding the work to said centers, substantially as set forth.

11. In a grinding-machine, the combination of the holding mechanism, a magazine for automatically feeding the work to said holding mechanism, said magazine being mounted on a pivot near its upper end, and held forward toward the holding mechanism by a yielding pressure, and formed to feed one piece of work to said work-holding mechanism at a time, and recede from said piece of work to permit the next piece of work to drop behind the piece being ground, and thus come into position to be received by said holding mechanism, and means for automatically receiving and releasing said work substantially as set forth.

12. In a grinding-machine, the combination of the positively-driven holding-centers formed to receive and hold the work by frictional contact, means for automatically moving one of said centers to release and clamp the work, and a yieldingly-held pivoted magazine for automatically feeding the work to said holding-centers, substantially as set forth.

13. In a grinding-machine, the combina-

tion with the holding mechanism, of a work-holding magazine pivoted to swing into position to bring the part to be ground between the work-holding centers as each successive part is released from said work-holding centers, substantially as set forth.

In witness whereof I have hereunto set my hand and seal, at Waynesboro, Pennsylvania, this 21st day of March, A. D. 1902.

ABRAHAM B. LANDIS. [L. S.]

Witnesses:
D. J. CROSBY,
ALF. N. RUSSELL.