March 31, 1925. 1,531,281

J. F. GARBIN

MACHINE FOR GRINDING THE ENDS OF ARBORS FOR THE BALANCE WHEELS OF CLOCKS OR SIMILAR ARTICLES

Filed March 31, 1923 4 Sheets-Sheet 1

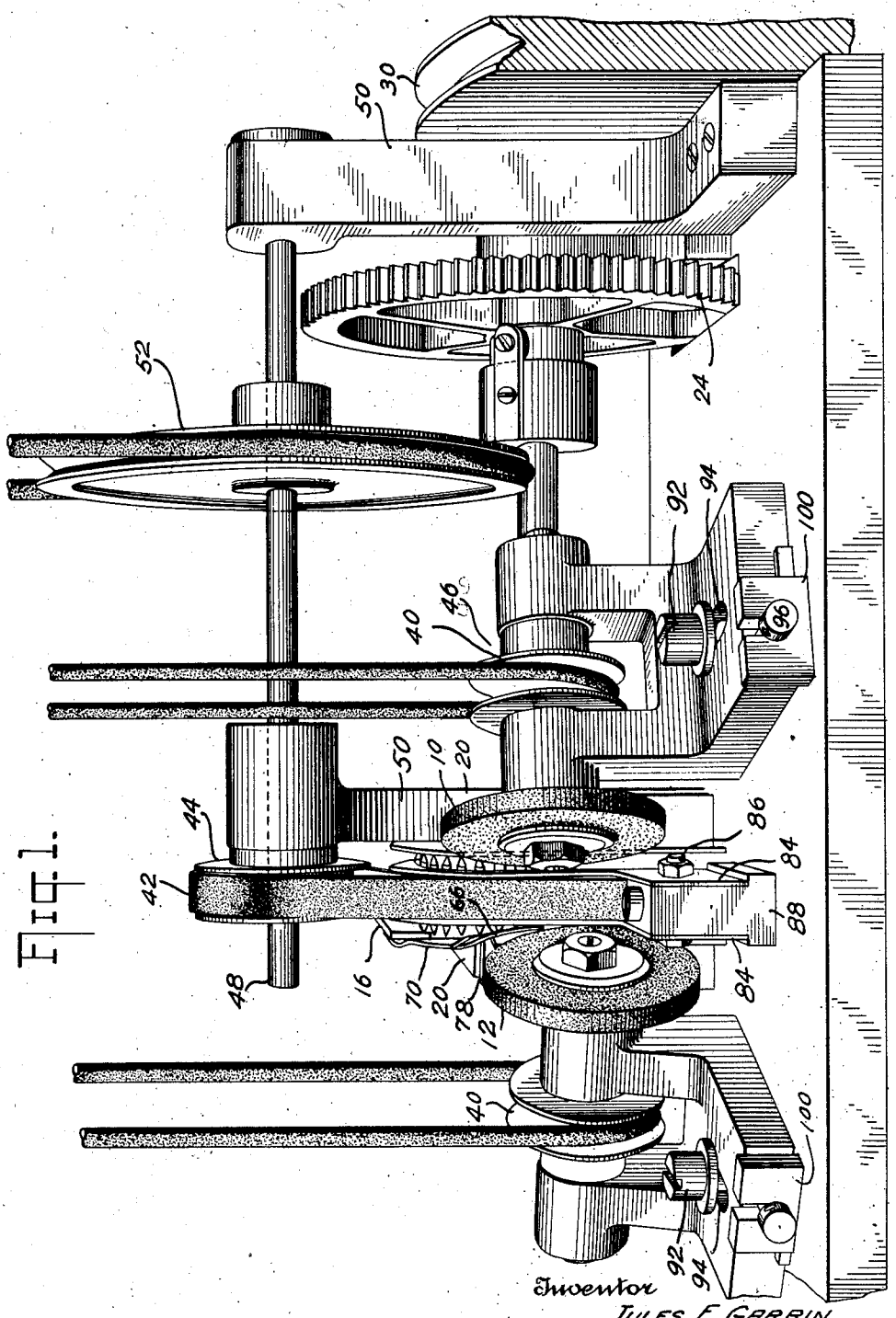


Fig. 1.

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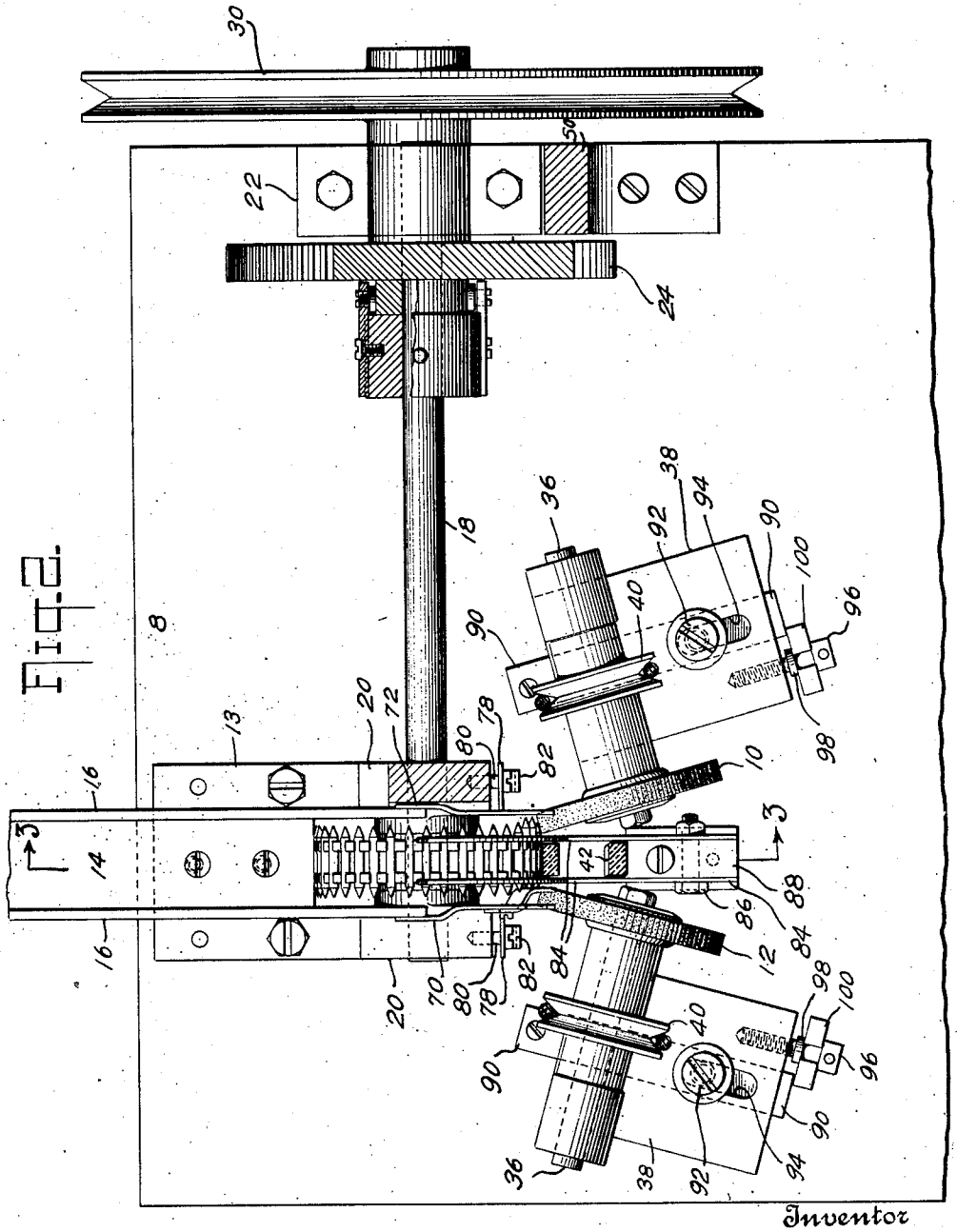
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Fig. 2.



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Filed March 31, 1923 4 Sheets-Sheet 3

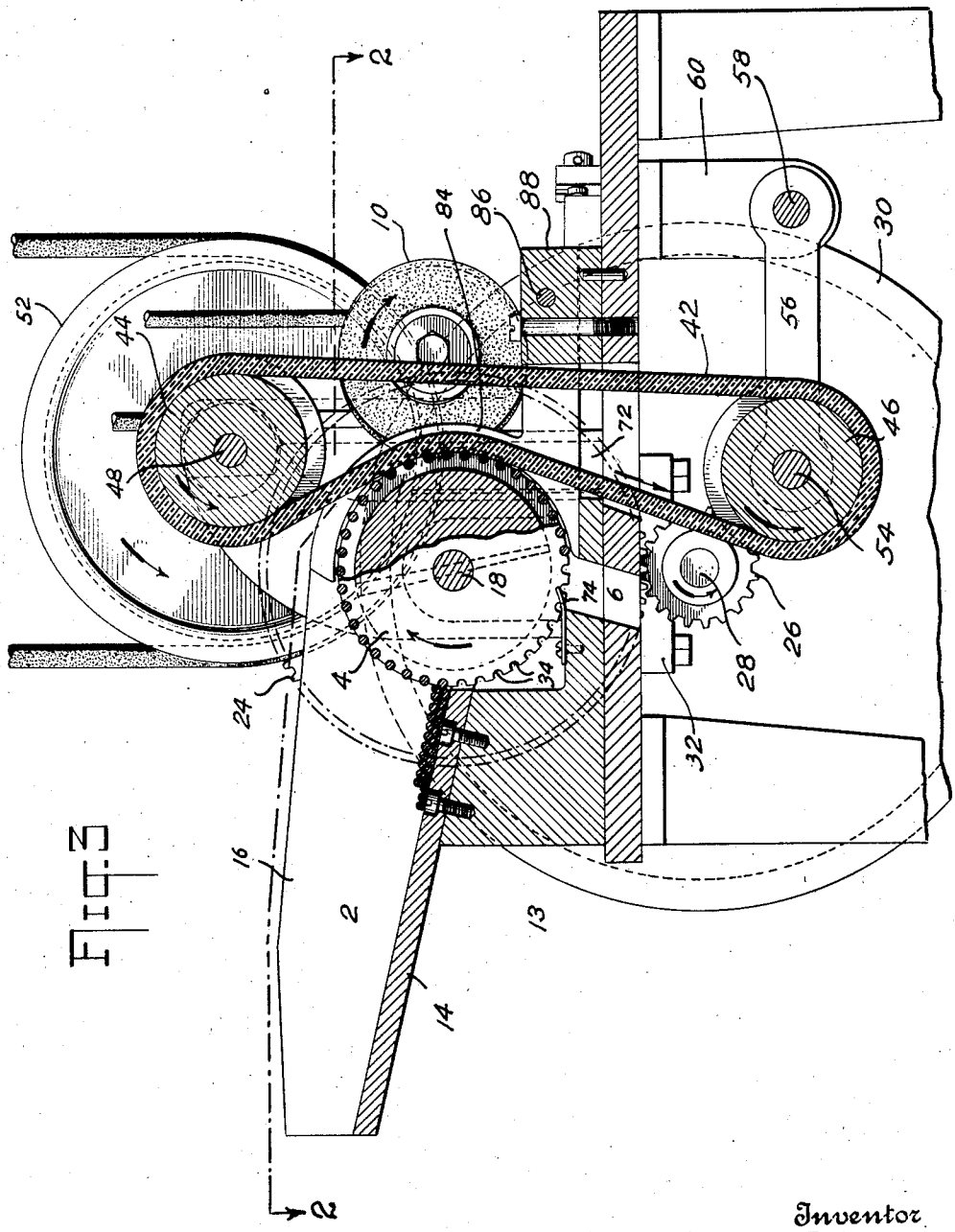


FIG. 2

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MACHINE FOR GRINDING THE ENDS OF ARBORS FOR THE BALANCE WHEELS OF CLOCKS OR SIMILAR ARTICLES

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Fig. 4.

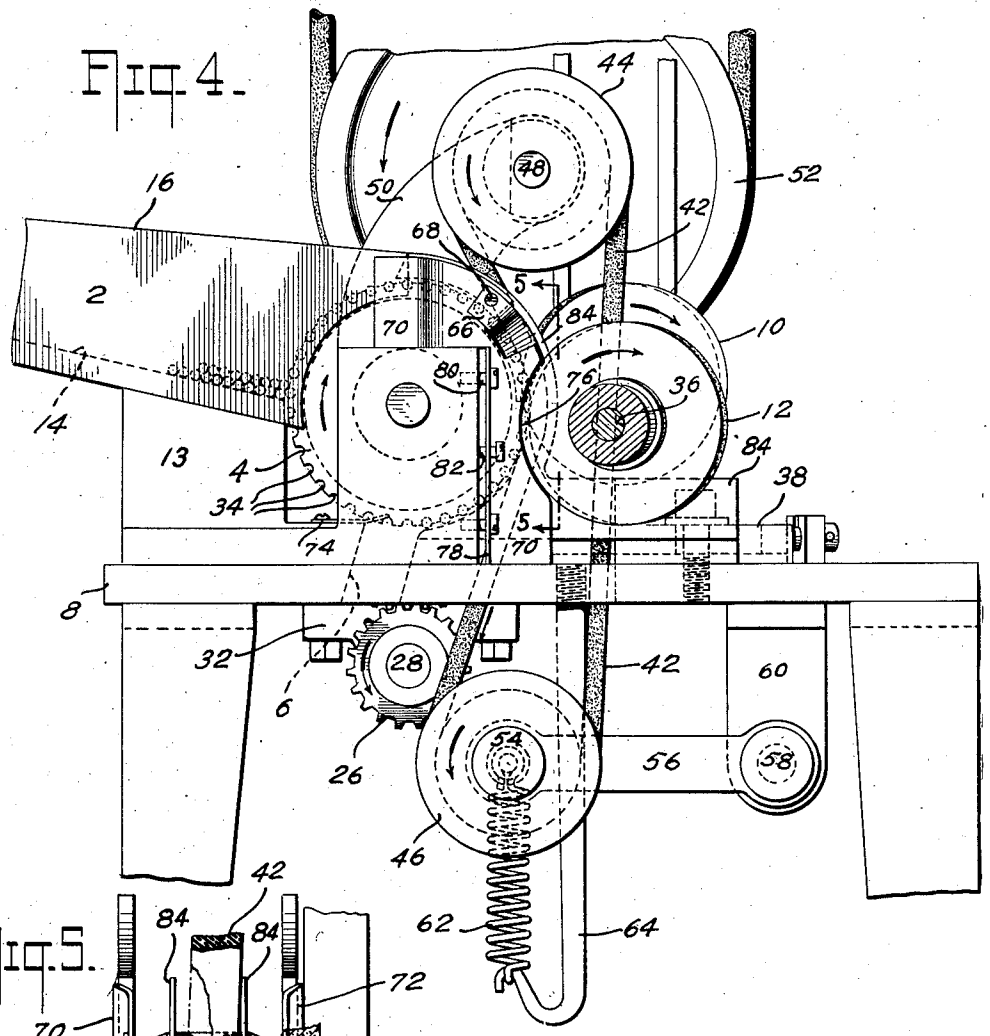
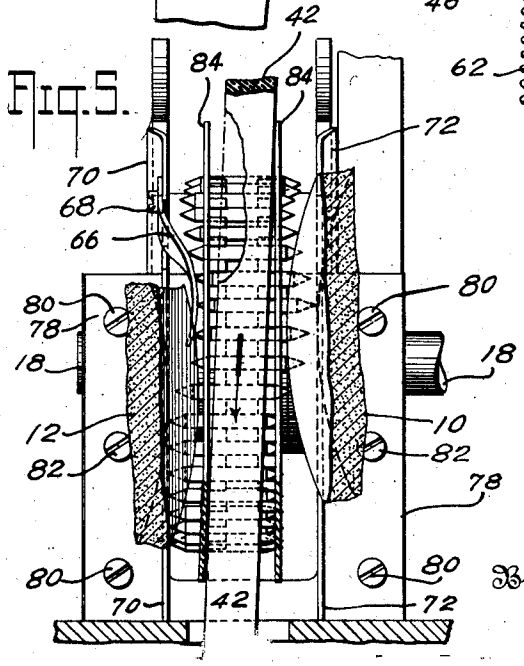


Fig. 5.



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Patented Mar. 31, 1925. 1,531,281

UNITED STATES PATENT OFFICE.

JULES F. GARBIN, OF WINSTED, CONNECTICUT, ASSIGNOR TO WILLIAM L. GILBERT CLOCK COMPANY, OF WINSTED, CONNECTICUT, A CORPORATION OF CONNECTICUT.

MACHINE FOR GRINDING THE ENDS OF ARBORS FOR THE BALANCE WHEELS OF CLOCKS OR SIMILAR ARTICLES.

Application filed March 31, 1923. Serial No. 629,006.

To all whom it may concern:

Be it known that I, JULES F. GARBIN, a citizen of the United States, residing at Winsted, county of Litchfield, State of Connecticut, have invented a certain new and useful Improvement in Machines for Grinding the Ends of Arbors for the Balance Wheels of Clocks or Similar Articles, of which the following is a full, clear, and exact description.

My invention relates to machines for grinding arbors for the balance wheels of clocks or similar articles, and has for its object to provide a machine of this character which is simple in construction and highly efficient in operation.

The following is a description of my invention reference being had to the accompanying drawings, in which,—

Figure 1 is a view in perspective of a portion of a machine embodying the features of the invention in their preferred form;

Fig. 2 is a sectional plan view of the same taken substantially on the line 2—2 of Fig. 3;

Fig. 3 is a sectional view, on an enlarged scale, taken on the line 3—3 of Fig. 2;

Fig. 4 is a side elevation, partly in section and with parts broken away, of the machine; and

Fig. 5 is a detail sectional view, on an enlarged scale, taken on the line 5—5 of Fig. 4.

The machine illustrated in the drawings is particularly adapted for use in grinding the ends of arbors for the balance wheels of clocks, the ends of the arbors being previously pointed and hardened. As shown, the machine is provided with a magazine 2, a carrier wheel 4 for feeding the arbors from the magazine and discharging them through an aperture 6 in a base plate 8 of the machine frame and grinding wheels 10 and 12 for operating on the ends of the arbors, respectively, as the arbors are being carried by the carrier wheel. The axes of the wheels 10 and 12 are respectively above and below the horizontal plane passing through the axis of the carrier. The magazine 2 is secured on a bracket 13 on the base plate 8 and comprises a hopper having an upwardly and rearwardly inclined bottom wall 14 and vertical sides 16. The carrier wheel is carried by a shaft 18 which extends through and is journaled in bearings in vertical arms 20 on the bracket 13, and in a bearing block 22 secured to the base plate 8. The shaft 18 is continuously driven in the direction of the arrow shown in Fig. 3 by means of a gear 24 secured thereon which is operatively engaged by a pinion 26 carried by a shaft 28 which is driven through a pulley 30 carried thereby, the shaft 28 being journaled in suitable bearings in hangers 32 secured on the under side of the base plate 8. The carrier wheel 4 is provided with a series of transversely extending semi-cylindrical recesses 34 in its peripheral surface, the recesses being of suitable size to receive the arbors from the magazine during the rotation of the carrier wheel.

The grinding wheels 10 and 12 preferably of emery are mounted on the inner ends of shafts 36 which are journaled in bearings in blocks 38 mounted on the base plate 8. The shafts 36 are each driven through a pulley 40 secured on its shaft between the shaft bearings on the block 38. The axes of the polishing or grinding wheels 10 and 12 are arranged at the proper angle with relation to the axis of the carrier wheel 4 to bring their peripheral surfaces in position to effectively act on the ends of the arbors, and the axis of the polishing or grinding wheel 10 is spaced a distance above the plane of the axis of the carrier wheel 4, and the axis of the grinding wheel 12 is spaced a distance below the plane of the axis of the carrier wheel so that the arbors are first acted upon by the grinding wheel 10 and then after passing the plane of the axis of the carrier wheel 4 are acted upon by the grinding wheel 12. The machine is further provided with means for spinning the arbors in the recesses while they are being acted upon by the grinding wheels and for positioning the arbors in the recesses as they are being carried by the carrier wheel. As shown, this means comprises an endless friction belt 42 which is held under tension and is arranged so that one of its stretches passes over a portion of the peripheral surface of the carrier wheel in the same direction as the rotation of the wheel and by frictional engagement with the arbors in the recesses as they are being carried by the grinding wheels act to spin the arbors in the recesses against the action thereon of the grinding wheels, the belt being driven at

considerably greater speed than the carrier wheel and being made of rubberized fabric or other suitable friction material. The belt 42 passes over pulleys 44 and 46 that are arranged a distance above and below the horizontal plane of the axis of the carrier wheel. The pulley 44 is carried by a shaft 48 which extends through and is journaled in bracket arms 50 mounted on the machine base plate 8, the shaft being driven through a belt and pulley 52 carried thereby. The pulley 46 is loosely mounted on a stud 54 secured on the free end of an arm 56 pivotally mounted on a pin 58 secured in a hanger 60 on the under side of the base plate 8. The arm 56 is urged downwardly to place the desired tension on the belt 42 by means of a coiled spring 62 having one end secured to the free end of the arm 56 and its other end secured to a depending post 64 on the under side of the base plate 8.

The belt pulleys 44 and 46 are so positioned with relation to each other that the belt is inclined slightly with relation to the plane of rotation of the carrier wheel so that the belt as it is being driven tends to shift the arbors engaged thereby axially toward the left, viewing Fig. 5. As the arbors are carried into position to be engaged by the belt, however, their left-hand ends are brought into engagement with the free end portion of a spring arm 66 which is secured by a screw 68 to a guide plate 70 hereinafter described. As the ends of the arbors ride over the spring arm 66 they are shifted by the arm toward the right until their right-hand ends are brought into engagement with a guide plate 72 hereinafter described, this shifting movement of the arbors being effected against the action of the belt 42. While the right-hand ends of the arbors are in engagement with the guide plate 72 they are carried by the carrier wheel into engagement with the peripheral surface of the grinding wheel 10 at a little distance above its center. Upon engagement with the grinding wheel, the curved end of the spring arm 66 permits them to be shifted by the belt 42 toward the left across the peripheral surface of the grinding wheel 10 and this shifting movement of the arbors toward the left continues as they approach the plane of the axis of the carrier wheel, the ends of the arbors leaving the grinding wheel when the arbors are near the plane of the axes of the carrier wheel and grinding wheel 10. This completes the grinding operation on the right-hand ends of the arbors. As the arbors pass the free end of the spring arm 66 at about the plane of the axis of the carrier wheel their shifting movement toward the left by the action of the belt 42 continues so as to first bring the left-hand ends of the arbors in contact with the inner portion of the peripheral surface of the grinding wheel 12 near the plane common to its axis and the axis of the carrier wheel and then to shift the arbor ends across the peripheral surface of the grinding wheel 12 until their left-hand ends are brought into engagement with the guide plate 70 which prevents further shifting movement of the arbors by the action of the belt 42 and thus positively determines the extent of the grinding action on the left-hand end of the arbors.

The axial movements of the arbors are thus effected by the guide arm 66 and the belt 42 and in the embodiment shown the movement during both grinding actions is all due to the belt and in one direction, this being preferable. After each arbor passes the grinding wheels 12 it is carried by the carrier wheel to a position directly above the aperture 6 through which it is permitted to drop into a receptacle located beneath the machine, a spring plate 74 being suitably arranged to engage the arbors after they reach a position above the aperture 6 to insure their discharge from the carrier wheel. As shown the plates 70 and 72 are arranged substantially in alinement with the inner faces of the vertical sides of the magazine 2 and the forward portions of the plates are cut away at 76 so as to closely surround the effective portion of the peripheral surfaces of the grinding wheels. The plates 70 and 72 are provided with lateral projections 78 which are secured to the vertical front sides of the bracket arm 20 by means of screws 80 extending through apertures in said projections and screw-threaded into the bracket arms and by screws 82 screw-threaded through central apertures in said projections with their ends abutting said bracket arms. By adjusting the screws 80 and 82 the guide plates 70 and 72 may be adjusted as desired toward and from the peripheral surfaces of the grinding wheels 10 and 12.

To insure the arbors being properly maintained in the recesses in the carrier wheel as they are being operated upon, a pair of guide plates 84 are provided having their rear edges curved so as to follow the contour of the peripheral surface of the carrier wheel and to almost engage the cylindrical surfaces of the arbors adjacent to opposite edges of the friction belt 42. The guide plates 84 are secured by a bolt 86 to a block 88 mounted on the base plate 8.

From the foregoing it will be apparent that the machine operates entirely automatically to feed the arbors from the magazine and into position to be operated upon by the grinding wheels and, after being operated upon by the grinding wheels to discharge them from the machine. Also that the arrangement of the grinding wheels and the devices for presenting the arbors to the

action of the grinding wheels is such as to insure the ends of the arbors being ground rapidly and with a uniform degree of accuracy.

The blocks 38 on which the grinding wheel shafts are mounted are adapted to be adjusted to adjust the position of the grinding wheels at right angles to their axes to compensate for wearing of the grinding wheels, and to enable the grinding wheels to be adjusted to accommodate the machine to operate upon arbors of different sizes, the arrangement of the yielding spring arm 66 and the adjustable guide plates 70 and 72 being such as to enable arbors of different lengths to be acted upon thereby. The grinding wheel carrying blocks 38 are adjustably mounted on the base plate 8 by means of guide bars 90 secured on the base plate and received in longitudinally extending grooves in the blocks 38. An adjusting screw 92 extends through an elongated slot 94 in each block 38 and is screw-threaded into the bar 90, and an adjusting screw 96 is screw-threaded into the forward end of each block and is held from axial movement by collars 98 thereon arranged at opposite sides of a stop member 100 secured to the base plate 8, the adjusting screw 96 extending through a slot in the member 100 so that by loosening the screw 92 and adjusting the screw 96 each block 38 may be adjusted as desired.

In operation the carrier is preferably driven so as to revolve at the rate of about two revolutions per minute while the belt 42 is driven so as to rotate the arbors on their axes at about 3000 revolutions per minute, and the grinding wheels 10 and 12 are driven at the rate of 10,000 revolutions per minute.

As will be evident to those skilled in the art, my invention permits of various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a magazine, means comprising a rotating carrier wheel for feeding articles having tapered ends from the magazine with the ends of the articles projecting beyond the sides of the wheel, and means for grinding first one and then the other of the tapered ends of the articles as they are being thus fed.

2. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a magazine, means comprising a rotating carrier wheel for feeding articles having tapered ends from the magazine with the ends of the articles projecting beyond the sides of the wheel, means for shifting the articles axially first in one direction and then the other on the carrier wheel, and a pair of rotating grinding wheels constructed and arranged to grind the tapered ends of each article during said shifting movements thereof, respectively.

3. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a rotating carrier wheel having recesses in its peripheral surface for receiving articles having tapered ends with the ends of the articles projecting beyond the sides of the wheel, and means for grinding the tapered ends of the articles comprising a pair of rotating grinding wheels, means cooperating with said carrier wheel to axially shift each article in its recess in one direction, and a traveling belt passing over a portion of the peripheral surface of said wheel in a plane inclined to the axis of rotation of said wheel so as to rotate said articles in said recesses, and impart an endwise thrust thereto in the other direction so that the ends of said article are successively presented to the action of said grinding wheels, respectively.

4. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a rotating carrier wheel having recesses in its peripheral surface for receiving articles with the tapered ends of the articles projecting beyond the sides of the wheel, and means for grinding the ends of the articles comprising a pair of rotating grinding wheels, and means for shifting said articles axially in one direction so as to present the end of each of them as they are being fed to one of said grinding wheels, and a traveling belt passing over a portion of the peripheral surface of said wheel in the same direction as the direction of rotation of said wheel but at a greater speed so as to rotate said articles in said recesses, the direction of travel of said belt being at an acute angle to the plane of rotation of said wheel so as to shift said articles axially in the other direction after being presented to said first grinding wheel, to present its opposite end to the other grinding wheel.

5. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a rotating carrier wheel having recesses in its peripheral surface for receiving articles having tapered ends with one end of the article projecting beyond the side of the wheel, means for grinding said end of the articles comprising a traveling belt passing over a portion of the peripheral surface of said wheel in the same direction as the direction of rotation of said wheel but at a greater speed so as to rotate said articles in said recesses, the direction of travel of said belt being at an acute angle

to the plane of rotation of said carrier wheel so as to tend to shift said articles axially in one direction, and a rotating grinding wheel constructed and arranged to act on said end of each article as it is being thus shifted by said belt.

6. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a pair of rotating grinding wheels spaced apart and means for feeding a plurality of articles and successively presenting the ends of each of them to the action of the grinding wheels, respectively.

7. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a rotating carrier wheel having recesses in its peripheral surface for receiving the articles with one end of each article projecting beyond the side of the wheel, a traveling belt passing over a portion of the peripheral surface of said wheel, means to move said belt relatively to said carrier wheel so as to rotate said articles in said recesses, a rotating grinding wheel constructed and arranged to act on said projecting end of each article as it is being rotated in its recess, and means for moving the articles longitudinally in their recesses as they are being acted upon by the grinding wheel.

8. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a rotating carrier wheel having recesses in its peripheral surface for receiving the articles with one end of each article projecting beyond the side of the wheel, a rotating grinding wheel constructed and arranged so as to cause its peripheral surface to act on said projecting end of each article as the article is being carried by the wheel, for rotating said article in its recess and for moving said article and said grinding wheel axially with relation to each other as the article is being acted upon by the wheel.

9. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a rotating carrier wheel having recesses in its peripheral surface for receiving the articles with the ends of the articles projecting beyond the sides of the wheel, means for shifting each article axially first in one direction and then the other, and for rotating the articles in the recesses, and a pair of rotating grinding wheels for acting successively on the ends of the articles during their shifting movement in one of said directions.

10. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a rotating carrier wheel having recesses in its peripheral surface for receiving the articles with the ends of the articles projecting beyond the sides of the wheel, a traveling belt passing over a portion of the peripheral surface of said wheel in the same direction as the direction of rotation of said wheel but at a greater speed so as to rotate said articles in said recesses, the direction of travel of said belt being at an acute angle to the plane of rotation of said wheel so as to tend to shift said articles axially in one direction, a guiding member comprising a spring arm arranged to be engaged by one end of said articles to shift the articles in the opposite direction against the action of said belt and to permit the shifting action of said belt to be effective to shift the articles in said first mentioned direction as their ends approach and ride off of the free end of said spring arm, and a pair of rotating grinding wheels constructed and arranged to act successively on the ends of the articles while the articles are being shifted by the belt.

11. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a rotating carrier wheel having recesses in its peripheral surface for receiving the articles with the ends of the articles projecting beyond the sides of the wheel, a traveling belt passing over a portion of the peripheral surface of said wheel in the same direction as the direction of rotation of said wheel but at a greater speed so as to rotate said articles in said recesses, the direction of travel of said belt being at an acute angle to the plane of rotation of said wheel so as to tend to shift said articles axially in one direction, means for shifting said articles axially in the opposite direction to a predetermined position and then to permit the shifting action of said belt to be effective to shift said articles in said first-mentioned direction, guiding members arranged to be engaged by the ends of the articles to positively limit their shifting movements in either direction, respectively, and grinding wheels constructed and arranged to act successively on the ends of the articles while they are being shifted by the belt.

12. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a magazine, a rotating carrier wheel having recesses in its peripheral surface for receiving articles from the magazine and carrying them a distance about the axis of the wheel and then discharging them from the machine, a belt passing over a portion of the peripheral surface of the carrier wheel, in the same direction as the direction of rotation of said

carrier wheel but at a greater speed and inclined at an acute angle to the plane of rotation of the wheel so as to tend to shift the articles axially in one direction in the recesses, means including a spring for tensioning the belt, means for shifting each article axially in the opposite direction to a predetermined position and then permitting the belt to shift the article in said first mentioned direction, and a pair of grinding wheels constructed and arranged to act successively on the ends of each article while the article is being shifted by the belt.

13. A machine for grinding the ends of arbors for the balance wheels of clocks or similar articles having tapered ends having, in combination, a rotating carrier wheel having recesses in its peripheral surface for receiving articles having tapered ends with the ends of the articles projecting beyond the sides of the wheel, means for grinding one of the ends of the articles comprising a grinding wheel, and means comprising a traveling belt passing over a portion of the peripheral surface of said wheel, and in a plane inclined to the axis of rotation of said wheel for moving the article longitudinally during the grinding operation.

14. Mechanism for feeding arbors for the balance wheels of clocks or similar articles having, in combination, a rotating carrier wheel having transverse recesses in its peripheral surface for receiving the articles, and means comprising a traveling belt passing over a portion of the peripheral surface of said wheel and in a plane inclined to the axis of rotation of said wheel for moving the articles longitudinally in their recesses.

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