(No Model.) 2 Sheets—Sheet 1.

H. E. KAY.

GRINDING MACHINE.

No. 437,996. Patented Oct. 7, 1890.

Fig. 1.

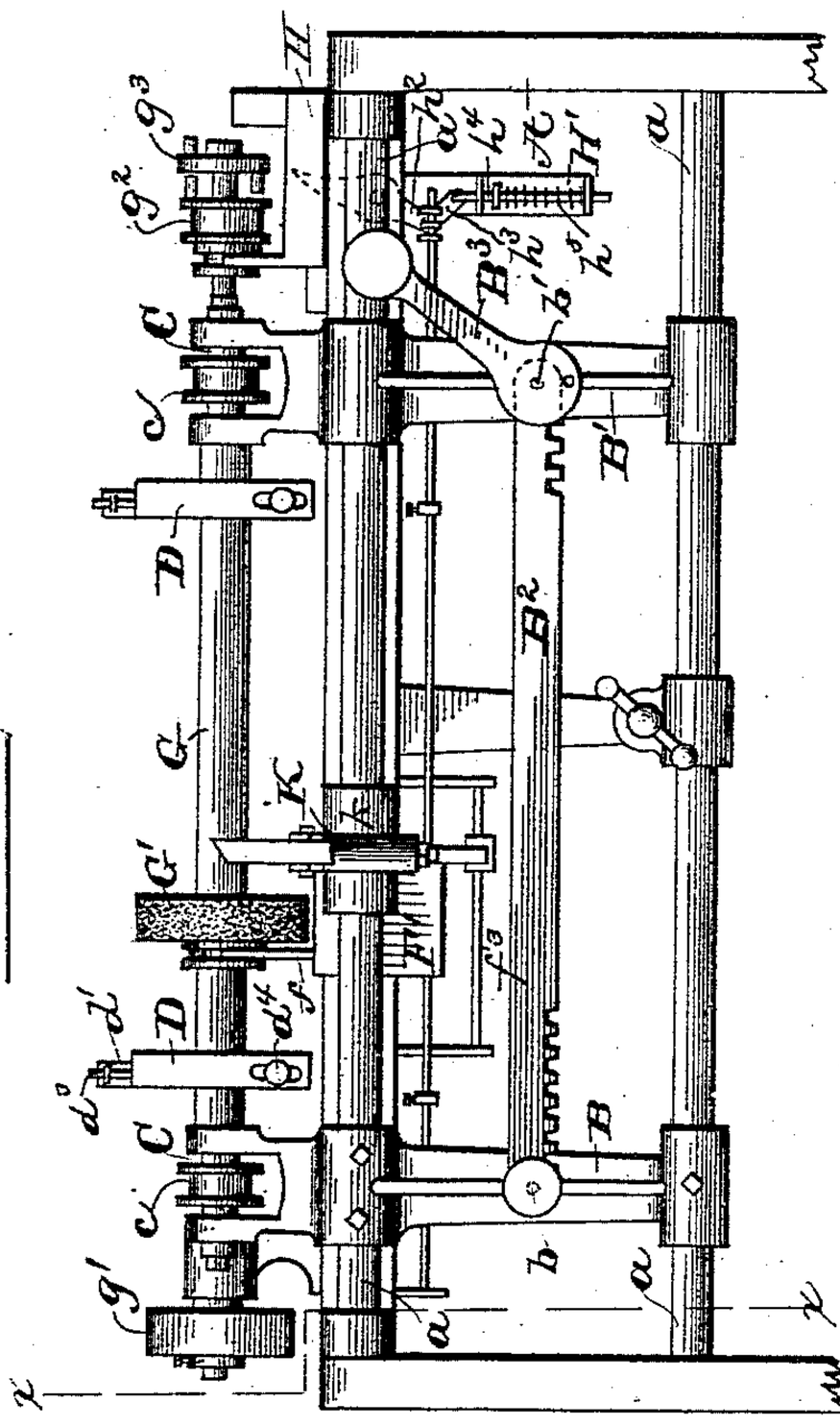


Fig. 2.

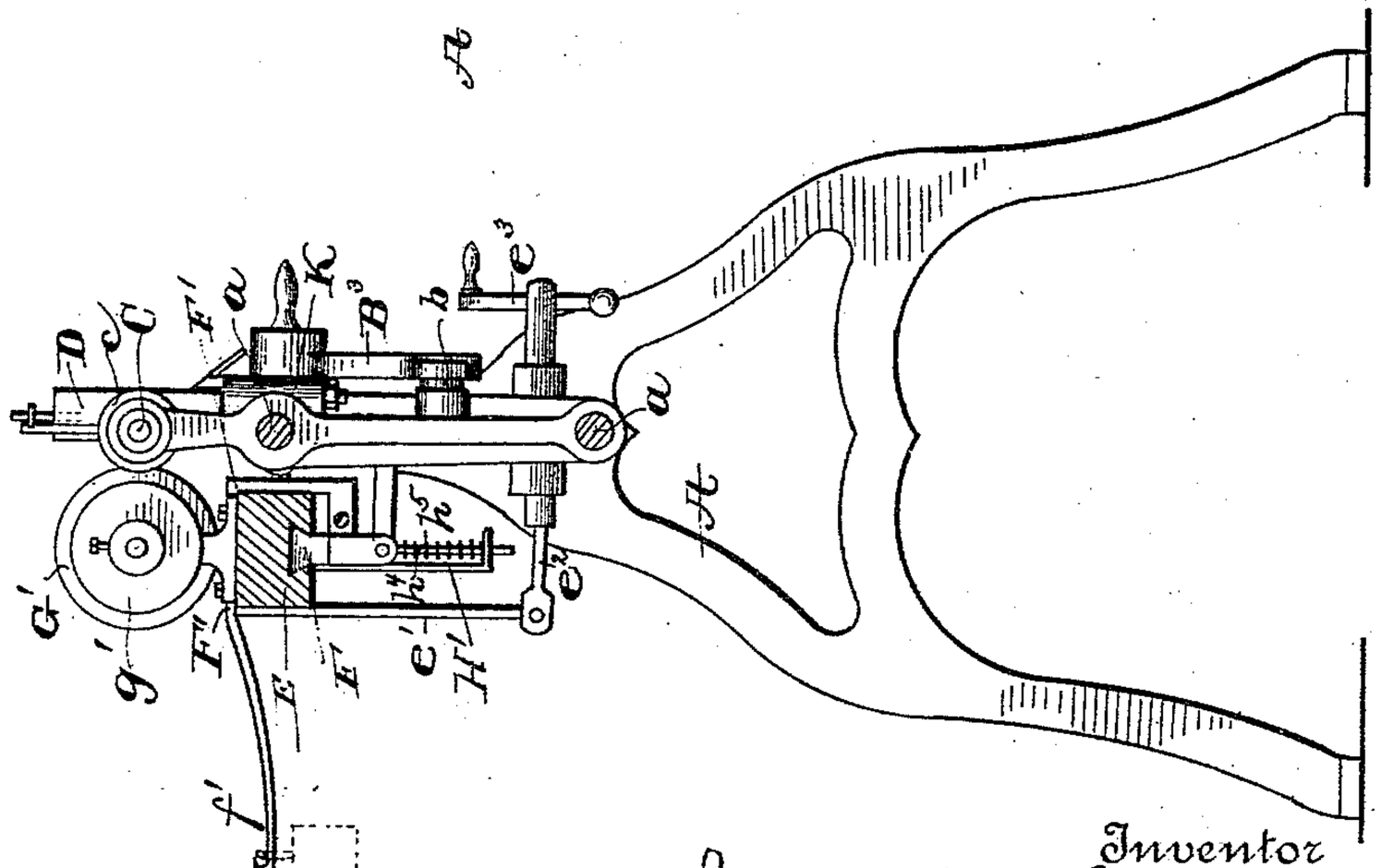


Fig. 3.

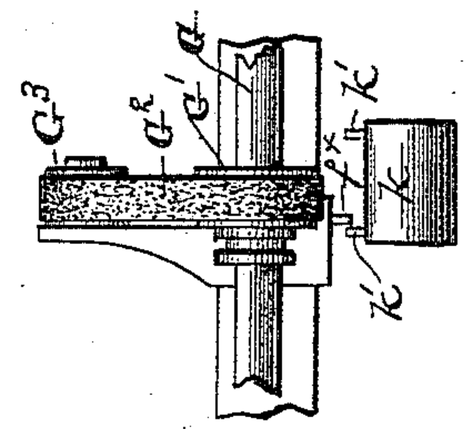


Fig. 4.

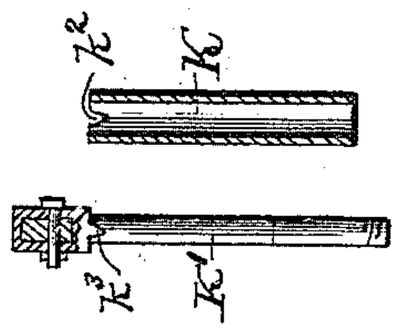
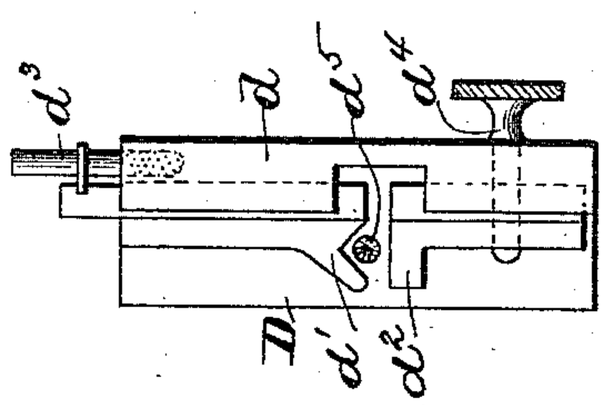


Fig. 5.



Witnesses

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(No Model.) 2 Sheets—Sheet 2.

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GRINDING MACHINE.

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Fig. 2.

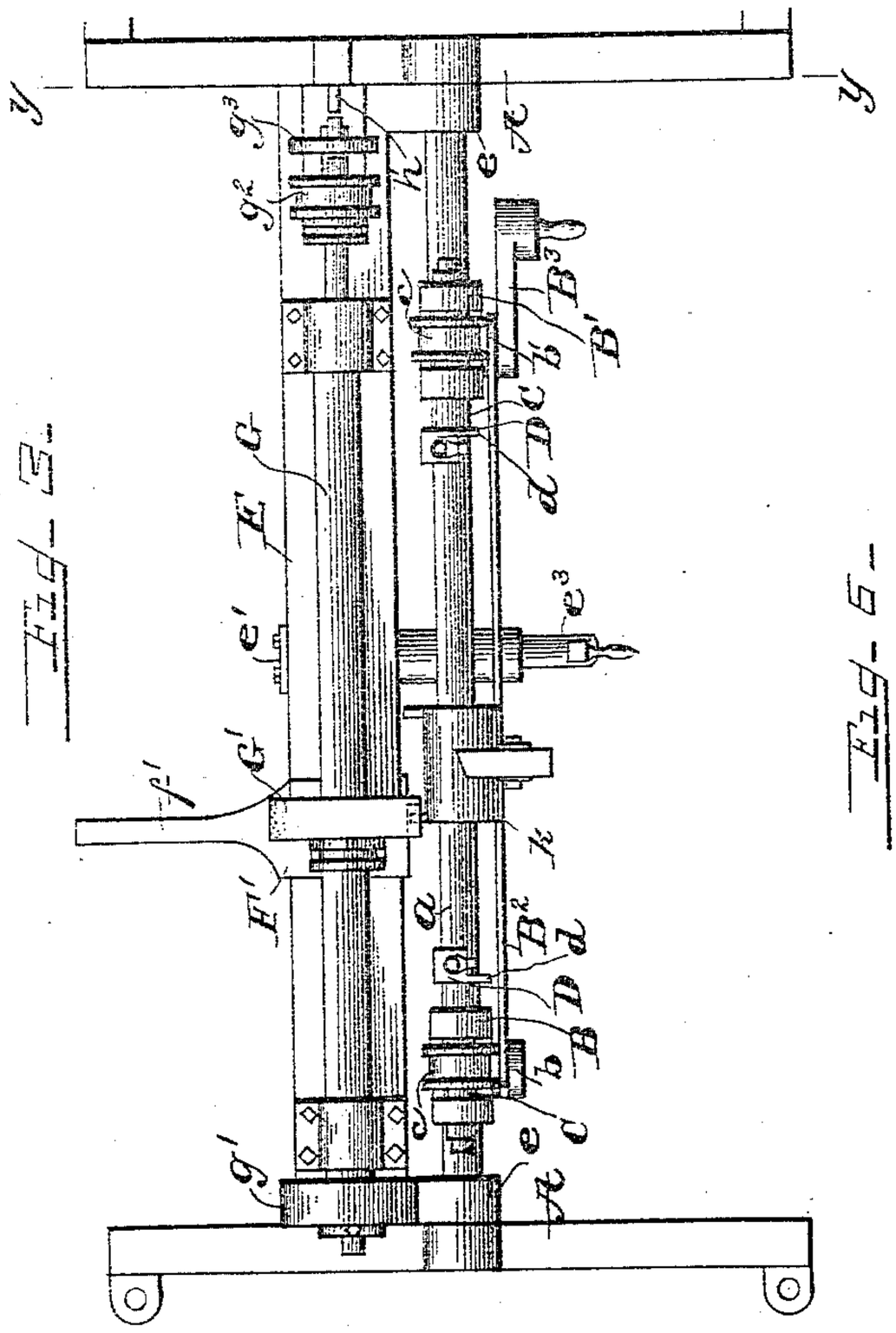

Fig. 3.

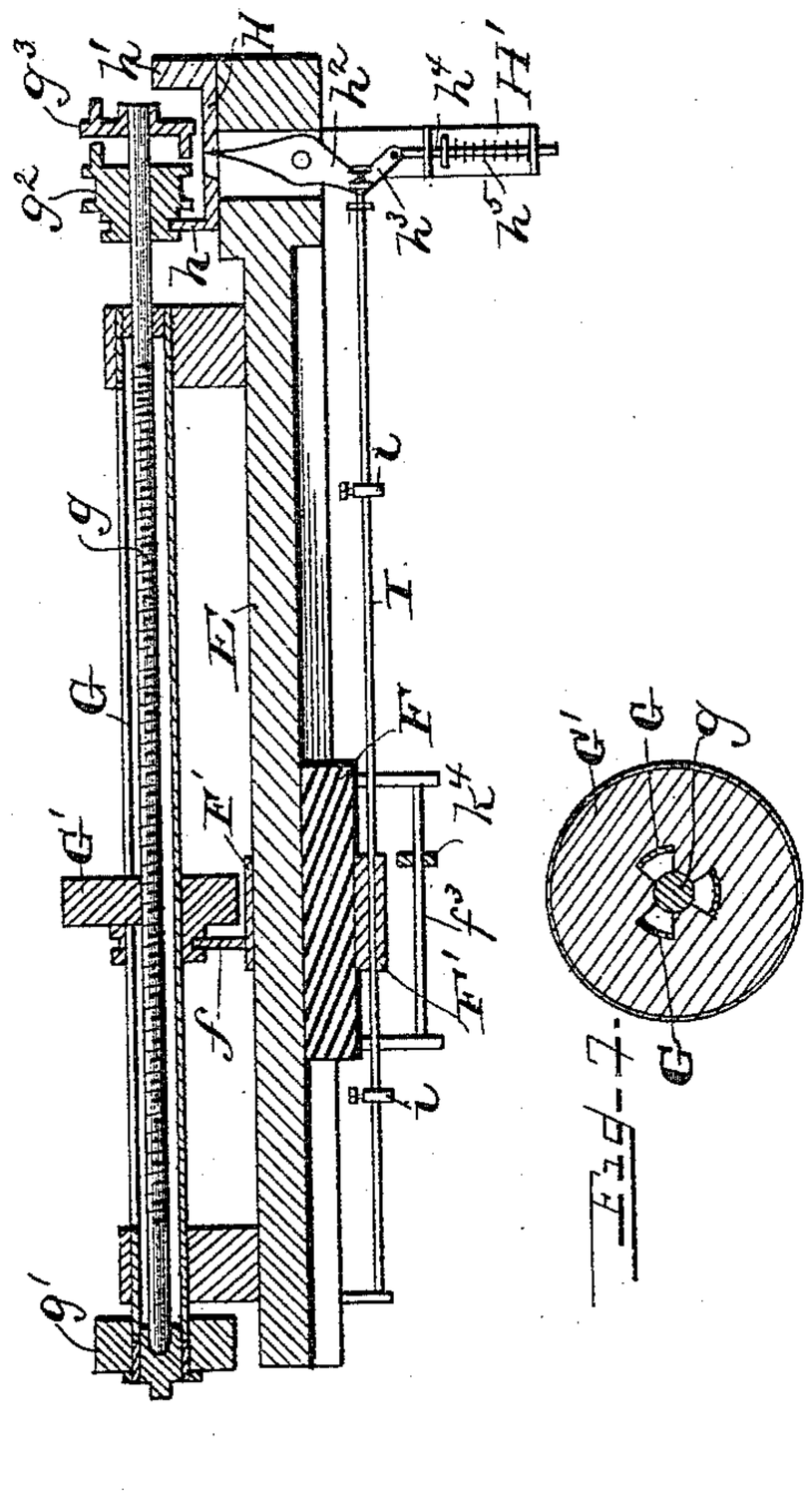

Fig. 4.

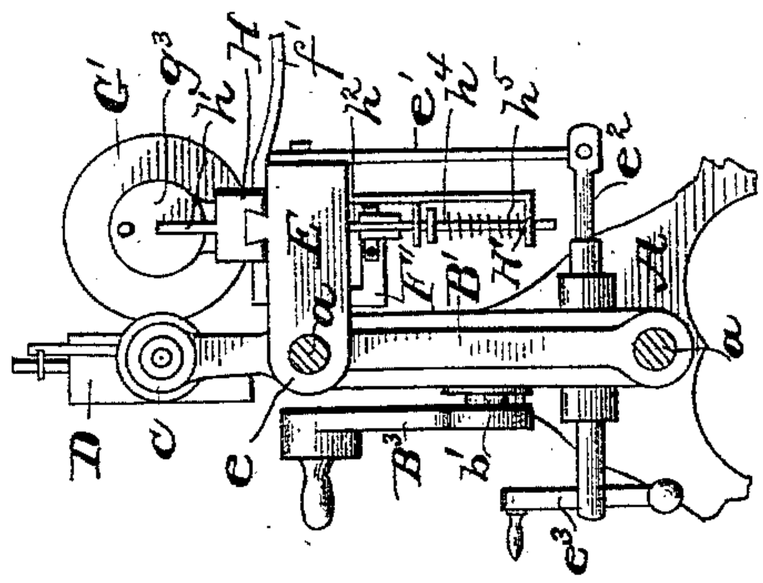

Fig. 5.

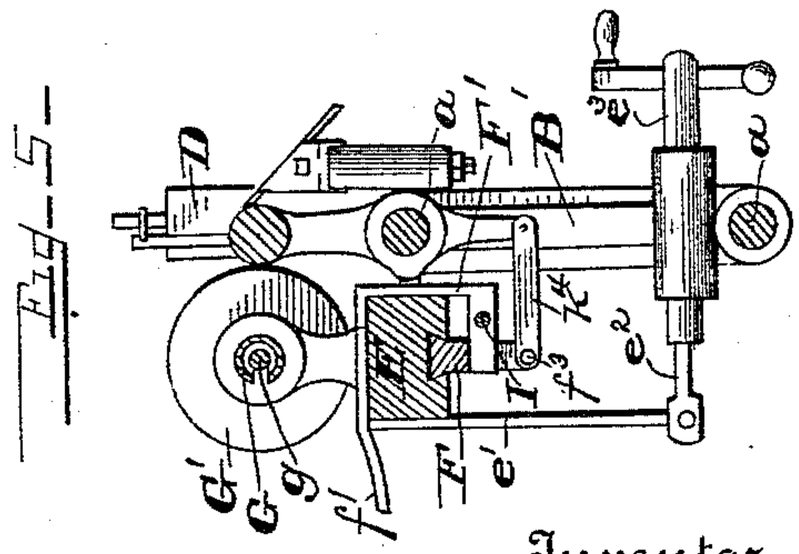

Fig. 6.

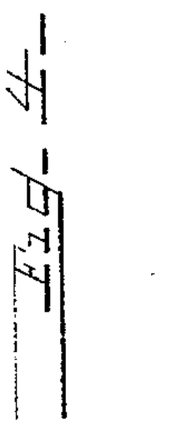

Fig. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

HENRY E. KAY, OF FALL RIVER, MASSACHUSETTS.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 437,996, dated October 7, 1890.

Application filed May 12, 1890. Serial No. 351,470. (No model.)

To all whom it may concern:

Be it known that I, HENRY E. KAY, a citizen of the United States, residing at Fall River, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Grinding-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to grinding-machines, and is an improved machine for grinding the leather-covered rolls for use in spinning-machines and for other purposes.

I have illustrated in the accompanying drawings one form in which I have contemplated embodying my invention, and the same is fully disclosed in the following description and claims.

Referring to the said drawings, Figure 1 is a front elevation of my improved machine, the supporting-legs being broken away. Fig. 2 is a transverse vertical section of the same on line *x x*, Fig. 1, looking to the right. Fig. 3 is a top plan of the machine. Fig. 4 is a transverse vertical section of the machine on line *y y*, Fig. 3, looking left. Fig. 5 is a partial transverse section through the center of the machine. Fig. 6 is a horizontal longitudinal section through the shell, the screw being shown in elevation. Fig. 7 is an enlarged sectional view of the grinding-roll, shell, and screw. Fig. 8 is a detail view, enlarged, of one of the cup-centers for holding the roll to be operated upon. Fig. 9 is a detail view showing the method of securing the cutting-tool in its holder. Fig. 10 is a view of a slightly different construction of grinding-tool.

The frame of my machine consists of the end pieces or standards A A, having suitable supporting-legs and connected by the two rods or bars *a a*, rigidly secured to the end pieces. On these two bars are mounted the the fixed head-stock B and the movable head-stock B′, which carry the spindles C C, provided with the cup-centers D, for securing the ends of the roll to be operated upon, so that it will be rotated with the spindles. The fixed head-stock B is suitably secured to the rods *a a* and is provided with a pin or stud *b*, and the movable head-stock B′ is provided with a pivoted weighted lever B^3, having an eccentric lug or stud *b′*. The pins *b b′* are connected by the bar B^2, which is provided with a series of notches adjacent to one or both ends, forming an adjustable connector, and when the said bar is placed with one of its notches in engagement with each of said pins a movement to the right of the weighted lever B^3 will move the head-stock B′ to the left, and vice versa.

The construction of the cup-centers D is best seen in Fig. 8. Each of these devices consists of the block D, having the angular web or flange *d*, provided with a dovetailed groove, in which are located the movable crotch *d′* and the clamping-piece d^2. The crotch *d′* is adjusted by means of a screw d^3, as shown, and the clamping-piece d^2 is adjusted by means of a thumb-screw d^4, which engages the same and passes through a slot in the web or flange *d* of the block. The block D is also provided with a self-centering aperture or recess d^5 in the usual manner.

When it is desired to place a roll in position to be operated upon, the rod B^2 is placed with the proper notches in engagement with the studs *b b′*, according to the length of the roll, so that when the weighted lever B^3 is thrown to the right the centering-apertures of the opposing cup-centers will engage the ends of the trunnions of the roll. The clamping-piece d^2 is then moved up to engage the trunnion or the reduced extremity of the roll and secured by means of its thumb-screw, and the crotch is forced down into engagement with the trunnion or the end of the roll, thereby clamping the roll firmly and securing it to rotate with the cup-centers when power is applied to the spindles. By this means the roll will be held securely, and if the cup-centers should have become worn with use the roll will nevertheless be held to run true with the spindles by the clamping devices already described. The spindles are provided with suitable pulleys *c c* for imparting motion to the same from a suitable driving-shaft.

In rear of the upper brace-rod *a* is mounted the adjustable table E, which is pivotally secured to the upper rod by means of sleeves or collars *e e*, secured to the table and embracing said rod. To the rear edge of the table E is

secured the downwardly-extending arm e', to which is pivotally connected a horizontal arm e^2, which engages a screw-threaded construction on the lower rod a and is provided with a suitable operating-handle e^3. By rotating this handle the rod e^2 is moved longitudinally, and this effects the raising or lowering of the table E on its pivotal axis, as will be readily understood. Upon the table E is located the mechanism for grinding the rolls held in the cup-centers, which consists in a traversing grinding-roller.

The table E is provided with a dovetailed groove on its under side of nearly the extent of the table, which is engaged by a sliding block F, which I term the "carrier." To this carrier is secured the bracket F', which extends around the front edge of the table E and over its upper face, as shown in Figs. 2 and 5, and is preferably provided with a rearwardly-extending arm f'.

The table E is provided with suitable journal-bearings, in which are mounted the hollow shell G and the single-threaded screw g, which is arranged to turn within said shell and independently of the same. The shell G is provided with a longitudinal slot extending nearly the entire length of the same, and a grinding-roller G' is loosely mounted on said shell, having a portion of its hub extending through the said slot and engaging the screw, said part being screw-threaded, so as to be operated by the screw g. It will be seen that if the screw and shell are rotated in different directions or at different rates of speed in the same direction, by which the one is made to rotate with respect to the other, the grinding-roller, while rotating with the shell, will be caused to traverse from one end of the same toward the other. At one end of the table E the shell is provided with a pulley g' for rotating the same, and at the opposite end the screw g is provided with a pulley g^2. The arrangement with respect to the driving-shaft is such that the screw g will be driven at a much greater speed than the shell, and this is accomplished by making the pulley g' larger than the pulley g^2 or in any other suitable manner which will secure this result. It will thus be seen that when in operation the screw, revolving much faster than the shell in the same direction, will cause the grinding-roller G' to traverse in one direction, and in order to cause it to traverse in the opposite direction it is only necessary to reduce the speed of the screw below that of the shell, or to stop its rotation when the shell will be driven faster than the screw, and the traverse of the grinding-roller will be reversed without stopping its rotation or interfering therewith.

I have found that by causing the screw to revolve twice as fast as the shell and then stopping the screw to reverse the traverse I obtain very effective results; but any other arrangement of the relative speeds of the two parts may be employed.

The shell G may be provided with two or more slots, and the grinding-roller with a similar number of screw-threaded portions for engaging the screw, if desired.

In Fig. 7 I have shown a construction in which the shell is provided with three slots and the hub of the grinding-roller with three inwardly-extending portions to engage the screw.

I have shown a means for automatically controlling the traverse of the grinding-roller G', which is as follows: The screw g is provided with a disk g^3, having a lug or projection on either face of the same. The pulley g^2 is loose on the stem of the screw g, which is not screw-threaded at this point, and said pulley is provided on the face adjacent to the disk g^3 with a similar lug or projection to engage the lug on that side of said disk. When the pulley is moved near enough to the disk to effect this, the screw will be rotated with the pulley g^2, as will be readily seen.

Upon the table E is mounted a sliding trip-block H, suitably secured to the table and adapted to be moved longitudinally. One end of this block H is provided with a yoke h, which engages a score in the hub of the pulley g^2 in a well-known manner, and the other end is provided with a stopping lug or projection h', so situated that when the block is moved to disengage the pulley from the disk g^3 this stopping-lug will be brought into the path of the lug or projection on the adjacent face of the said disk, and will be instantly engaged by said lug, thereby stopping the rotation of the screw and holding it from further rotation until the block is moved in the opposite direction. The movement of said block in the opposite direction will engage the pulley g^2 with the disk and simultaneously disengage the stopping-lug therefrom, when the rotation of the screw will be instantly resumed. An actuating lever-arm h^2 is pivoted in a suitable recess in the table E and engages a slot in the block H. To the lower end of the arm h^2 is pivoted a second arm h^3, forming a toggle-lever, the lower end of the arm h^3 being pivoted to a yielding resistance, formed in this instance by a spring-actuated sliding rod h^4, mounted in suitable guides in a bracket-arm H' and held in its normal upward position by the spring h^5.

A horizontal rod I is suitably mounted beneath the table E, so as to be capable of movement longitudinally, and this rod is provided with adjustable collars i, which are engaged by some fixed portion of the traversing devices. The carrier F is provided with a yoke f, which engages a score in the hub of the reciprocating grinding-roller, and by this means the carrier is reciprocated with the grinder. When the carrier or other portion of the traversing mechanism strikes one of the collars i, the rod I will be moved longitudinally and operate upon the toggle-levers h^2 h^3. The slot in the block H is so arranged that as the toggle-lever is gradually forced into a rectilinear

position the upper end of the arm h^2 will traverse the slot and not move the block; but when the toggle-lever has been pushed slightly past the vertical position the spring-resistance will force it instantly into its second position, and this quick movement produces the movement of the block and the stopping or starting of the screw. To allow for this sudden movement, the rod I preferably engages the toggle-lever adjacent to its central pivot by passing through an eye connected therewith, or other device for giving a loose engagement between said parts, and the rod is provided with fixed collars at either side of this loose connection, which cause the shifting of the toggle-lever. The rod I may, however, be connected to the toggle in any other suitable manner.

In using the machine a grinding-roller of any desired construction is employed, such as a roller covered with sand-paper or other abrasive material. The surface of such a roll is necessarily limited and soon wears smooth, requiring frequent renewing.

In Fig. 10 I have shown a grinding-tool consisting of an endless belt G^2, of sand-paper or other material, having an abrasive surface running on the roll G′, and an idle-roller G^3, mounted on a suitable spindle secured to the rearwardly-extending arm of the carrier. This construction provides a much larger surface of grinding material, which will last longer without renewing. The belt G^2 will be operated by the roller G′, and will be reciprocated by the carrier and said roller through the instrumentality of the screw g in the manner before described. In addition to the grinding mechanism, I also provide a cutting-tool, which is intended to be used first in turning down the roll to be operated upon, and the roll is then finished by grinding.

The cylindrical socket K, which receives the cutting-tool, is provided with a sleeve k, which is fitted to slide on the upper rod a of the frame, and this sleeve is caused to traverse with the carrier F by means of two ribs or horns k' k', located on the inner side of said sleeve and adapted to be engaged alternately by a projection $f^\times$ on the carrier, or bracket F′.

The tool-holder consists of a cylindrical bolt or stem K′, the head of which is provided with a cutting-tool in any usual or desired manner. This holder is placed in the cylindrical socket, the upper edge of which is provided with one or more notches k^2, adapted to be engaged by corresponding lugs k^3 on the tool-holder. The stem K′ may extend entirely through the socket K and be secured by means of a nut, as shown in Figs. 2 and 5, or it may be used without a nut, if desired, so as to be instantly removable, in which case it may be made with a shorter stem, as indicated in dotted lines, Fig. 9. The construction of the lugs and notches before described will prevent the tool-holder and tool from turning in the socket.

The inclination of the tool-carrier and tool and the adjustment of the tool with respect to the work is effected by adjusting the table E in the manner heretofore described. To this end the carrier F is provided with depending arms, to which is attached the short horizontal guide-bar f^3, and the tool-carrier is pivotally connected to said bar by a connecting-bar k^4, (see Fig. 5,) engaging the same and pivoted to a depending arm of the tool-carrier. It will be seen that when the table E is lowered the grinding-roller will be moved away from the work, and by means of the connecting-bar k^4, just described, the sleeve k will be moved about the bar a to bring the cutting-tool nearer the work. In this manner the tool may be adjusted so as to turn down the leather roll, and the grinding-roller will remain meanwhile out of contact with the same. The grinding-roll may then be brought into engagement with the leather-roll by adjusting the table E so as to raise the same, and this will cause the cutting-tool to move away from the work.

The cutting-tool is caused to traverse from one end of the leather-roll to the other, and no farther; but it is desirable in order to secure uniform grinding of said roll that the grinding-roller should be carried past the end of the same before reversing. In order to effect this without carrying the cutting-tool beyond the end of the roll, where it would come into injurious contact with the work-holding devices, I provide the construction already described of the lug $f^\times$ on the carrier engaging one of two lugs k', located on the sleeve k at a short distance apart. By means of this construction when the tools have been carried to the end of their movement the cutting-tool will have stopped substantially at the end of the work, while the grinding-roll will have been carried past the end of the same. When the reverse movement begins, the grinding-roll will begin to travel by itself until it reaches a position in advance of the cutting-tool, when the lug $f^\times$ will strike one of the lugs k' on the tool-carrier, and the two tools will then move together. It will thus be seen that the grinding-roll precedes the cutting-tool when moving in both directions, and the cutting-tool is given a period of rest at the end of each traverse, while the grinding-tool is moving the distance between the two lugs k' k' on the tool-carrier. The rod f^3 permits the connecting-bar k^4 to slide thereon and maintain the connection between the carrier and the sleeve k.

It will be seen that the tool-carriage offers a resistance to the carrier F on the front of the machine, and to prevent this from causing said carrier to bind in its groove I provide the arm f' with a suitable weight, as indicated in dotted lines, Fig. 2, which causes a resistance at the rear of the machine to counterbalance the resistance of the tool-carrier, and this enables the carrier F to move evenly and smoothly.

In the use and operation of the machine

above described a roll to be ground and trued is placed in engagement with the cup-centers D, as before described, and set in rotation. The cutter is then adjusted to turn down the roll and the mechanism started, the collars *ii* having been previously adjusted to secure the automatic reversing of the traverse at the proper points. The arrangement of the shell and screw, before described, will cause the grinding-roll carrier F and cutting-tool to reciprocate automatically while the roll is being turned. The table E is then raised by means of the screw-handle e^3 to throw the cutting-tool out of engagement with the work and bring the grinding-roller into engagement with the same. The grinding-roll will then be reciprocated, as before, and will smooth and finish the leather-roll. It is obvious that the cutting-tool could be omitted and the construction herein shown and described could be used for grinding card-cylinders and other analogous purposes, and the construction for effecting the reciprocating traverse of the grinding-roll could be used for other purposes where a rotating and reciprocating movement is desired.

I do not wish to be limited to the exact construction herein shown and described, as variations can be made in many details without departing from the spirit of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. In a turning and finishing machine, the supporting-frame consisting of the end pieces or standards and rods connecting the same, in combination with a stationary head-stock and a movable head-stock adapted to slide on said rods, the adjustable connector adapted to connect said head-stocks at different distances apart, and means interposed between said connector and one of said head-stocks for moving said movable head-stock toward and from the stationary head-stock, substantially as described.

2. In a turning and finishing machine, the supporting-frame consisting of the end pieces or standards and rods connecting the same, in combination with a stationary head-stock and a movable head-stock adapted to slide on said rods, the adjustable connector, the weighted lever connected with the movable head-stock, and connector, said connections being the one eccentric to the other, substantially as described.

3. The combination, with the frame of the machine having parallel rods extending longitudinally of the same, of the fixed head-stock mounted rigidly on said rods, the movable head-stock adapted to slide on said rods, and the notched bar and weighted lever connecting said head-stocks, substantially as described.

4. In a turning and finishing machine, the combination, with a traversing tool, of a constantly-revolving slotted shell and the revolving screw within the same, said tool being mounted on said shell and engaging said screw, and means for rotating said wheel and screw in the same direction, substantially as described.

5. In a turning and finishing machine, the combination, with a traversing tool, of a revolving slotted shell and the revolving screw rotating within the same in the same direction, said tool being mounted on said shell and engaging said screw, and means for varying the relative speeds of said shell and screw, substantially as described.

6. In a turning and finishing machine, the combination, with a traversing tool, of a slotted shell revolving constantly at a uniform speed, a revolving screw rotating in the same direction within said shell, said tool being mounted on said shell and engaging the screw, and means for rotating the screw at a greater and less speed than said shell to produce the reciprocating traverse of the tool, substantially as described.

7. In a turning and finishing machine, the combination, with the slotted shell revolving constantly at a uniform speed and a revolving screw rotating within said shell at a greater degree of speed, of a traversing tool mounted on said shell and engaging said screw and means for reducing the speed of the screw below that of the shell, substantially as described.

8. The combination, with the shipping-block, of the spring-pressed toggle-lever loosely engaging the same and the sliding bar for actuating the toggle-lever, substantially as described.

9. The combination, with the machine-frame having a rod extending longitudinally of the same, of a tool-carrier mounted pivotally on said rod, a table carrying another tool pivotally mounted on said rod, connections between the tool-carrier and the table, and means for adjusting the table on the rod as an axis, whereby the adjustment of the two tools is simultaneously effected, substantially as described.

10. The combination, with the traversing grinding-tool and means for moving the same, of the cutter engaged by parts connected to said grinding-tool and moved thereby, the engagement permitting lost motion at the reversing points, substantially as described.

11. The combination, with the traversing grinding-tool and means for moving the same, of the cutter engaged by parts connected to said grinding-tool, one tool being provided with separated projections adapted to be engaged alternately by a projection from the other part lying between the same, substantially as described.

12. In a turning and finishing machine, the work-holding devices consisting of blocks provided with self-centering apertures and independently-adjustable clamping devices, substantially as described.

13. In a turning and finishing machine, the work-holding devices consisting of blocks provided with self-centering apertures, the

sliding crotch, and clamping device, and means for adjusting the same independently toward and from each other, substantially as described.

14. In a turning and finishing machine, the combination, with the work-holding devices, of the vertical tool-holding socket having a locking recess in its upper edge and a tool having a stem fitting said socket and provided with a projection fitting said recess, whereby said tool is securely held in operative position and may be instantly removed from its holder, substantially as described.

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

HENRY E. KAY.

Witnesses:
ARBA N. LINCOLN,
ALFRED H. HOOD.