No. 864,030. PATENTED AUG. 20, 1907.

F. H. PIERPONT.

MACHINE FOR GRINDING TYPE MATRICES AND OTHER BODIES.

APPLICATION FILED APR. 29, 1903.

2 SHEETS—SHEET 1.

Fig. 1.

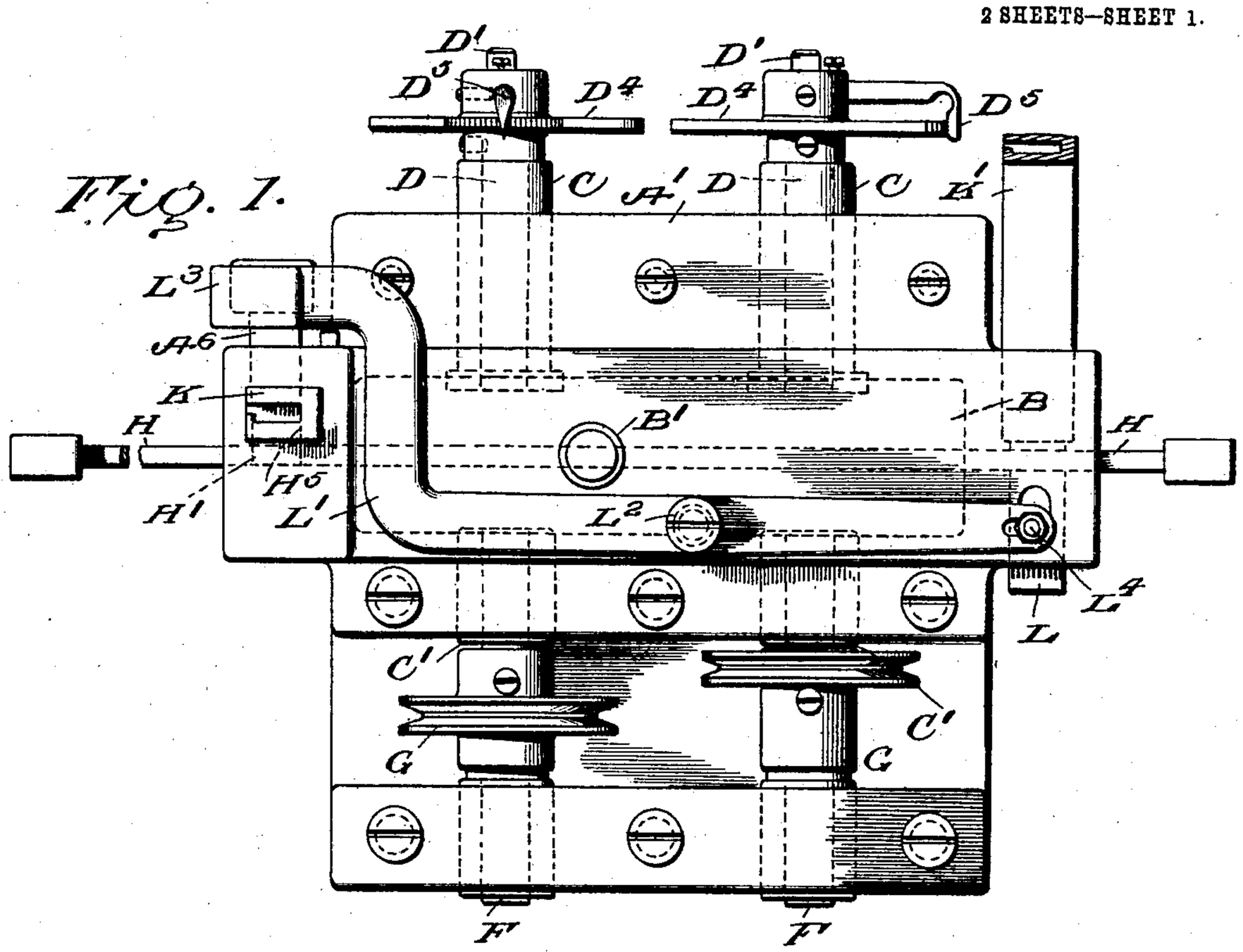

Fig. 2.

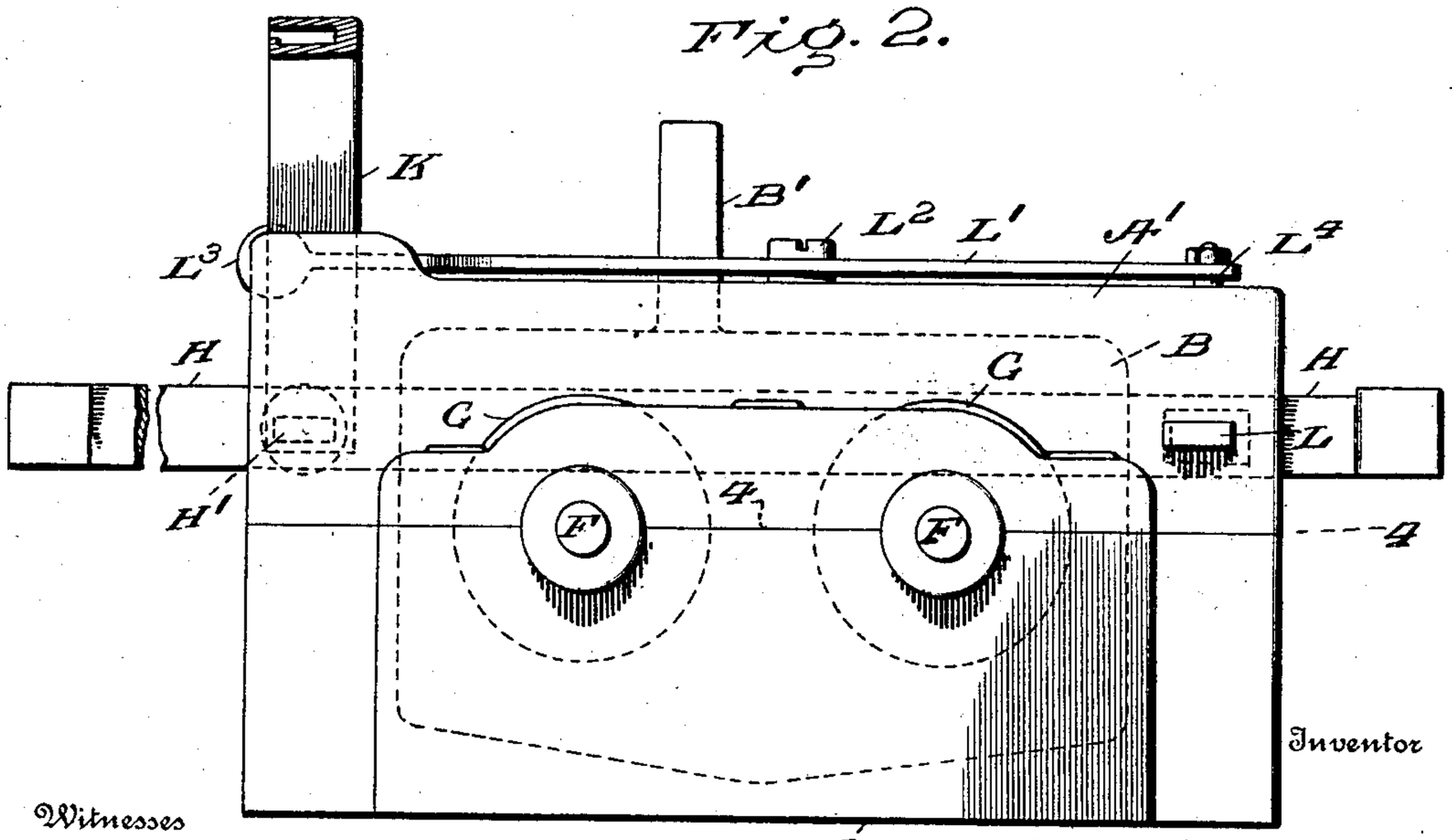

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Fig. 3.

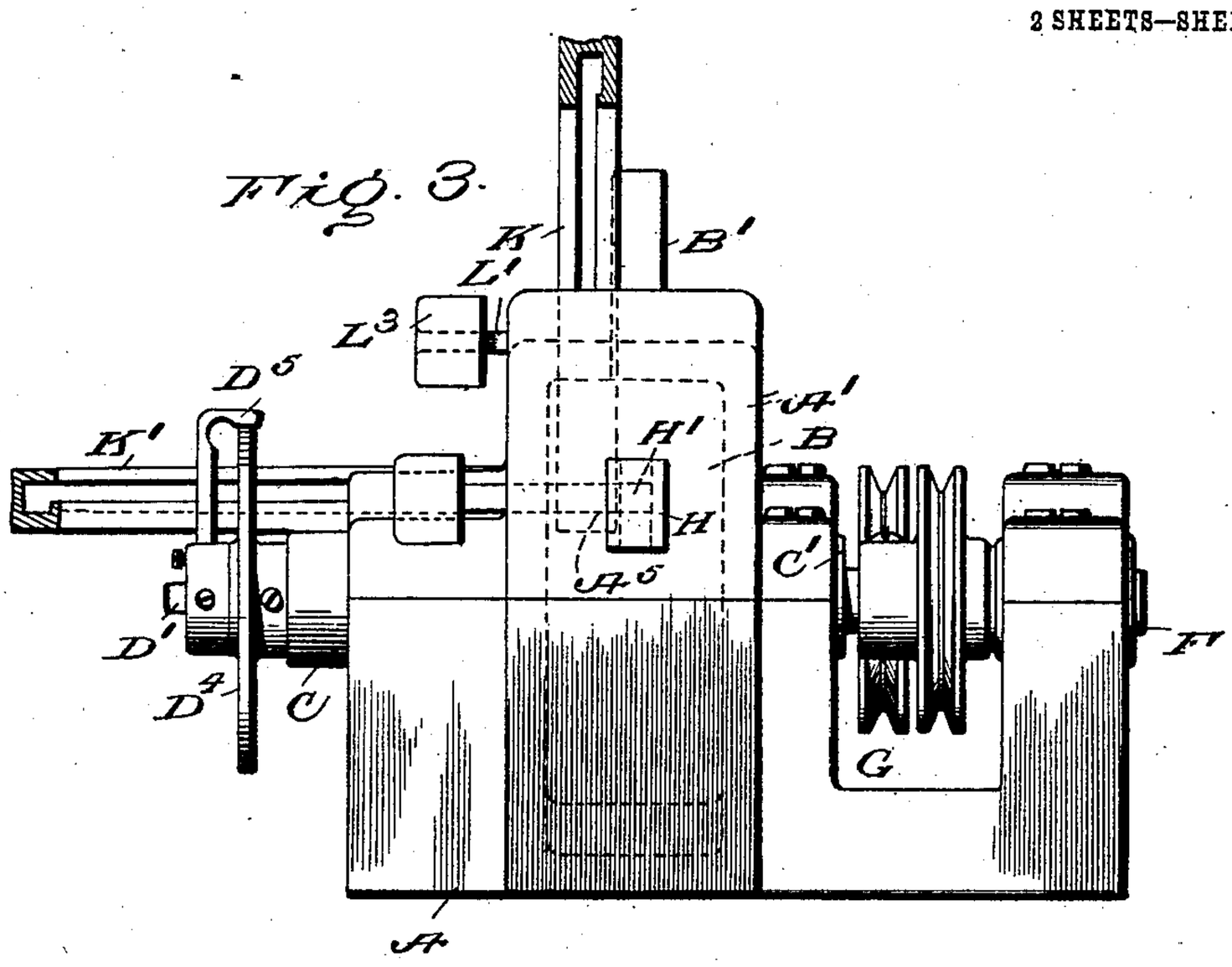


Fig. 4.

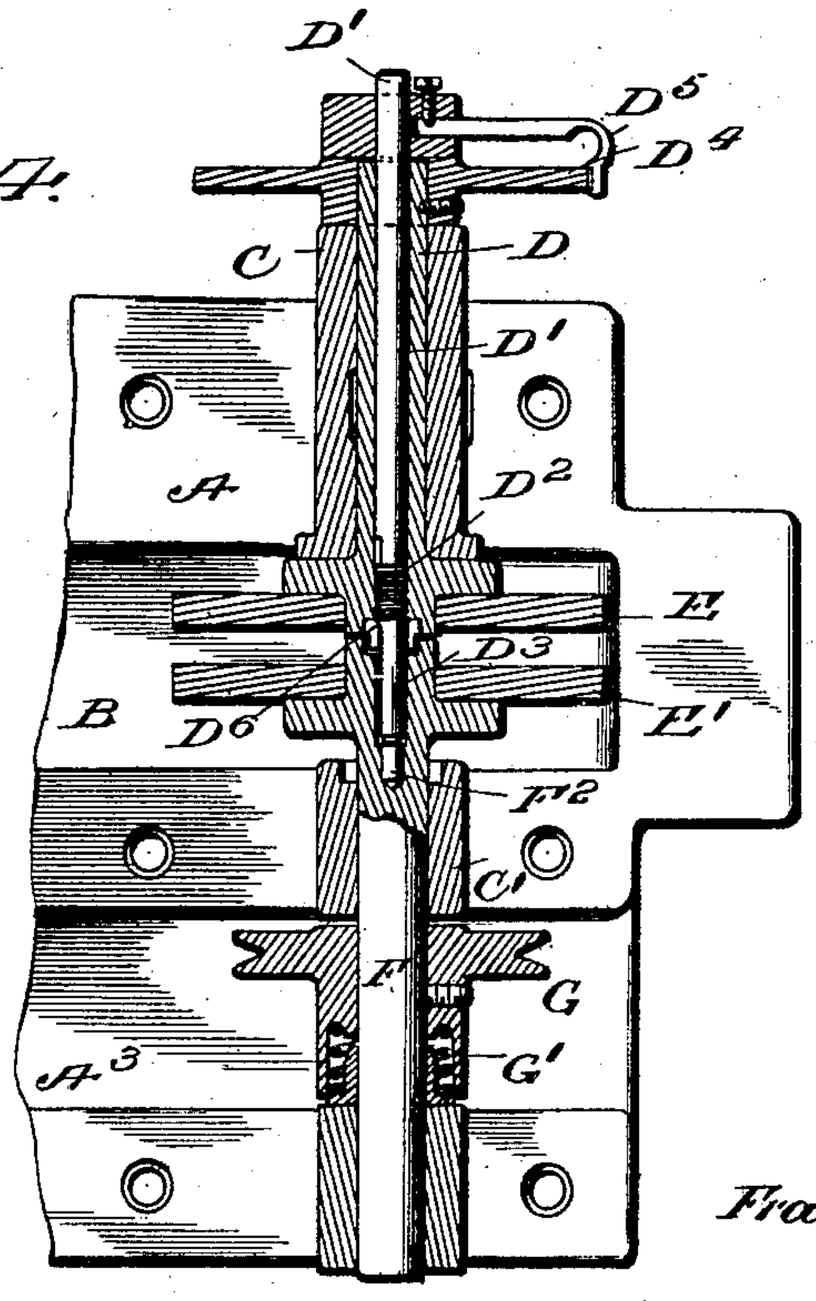
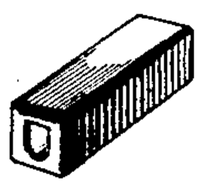


Fig. 5.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR GRINDING TYPE-MATRICES AND OTHER BODIES.

No. 864,030. Specification of Letters Patent. Patented Aug. 20, 1907.

Application filed April 29, 1903. Serial No. 154,877.

To all whom it may concern:

Be it known that I, FRANK HINMAN PIERPONT, a citizen of the United States, temporarily residing at Horley, county of Surrey, England, address 42 Drury Lane, London, England, have invented certain new and useful Improvements in Machines for Grinding Type-Matrices and other Bodies; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming a part of this specification, and to the figures and letters of reference marked thereon.

This invention relates primarily to an improved system or machine for accurately shaping the exterior of matrices and other like articles where great precision is required and it has for its objects to provide an efficient means whereby the finishing operation may be accurately and expeditiously performed and a superior finish or wearing surface be produced.

As is well known the matrices employed in type casting machines such as that of Patent No. 625,998, are composed of rectangular blocks of metal, preferably bronze, square in cross section, with the character driven or otherwise formed in or upon one end. It is very desirable that these matrices should be accurately formed, that is, should be straight, rectangular and uniform in dimension, and the present invention is designed to secure these results.

In the accompanying drawings—Figure 1 is a top plan view Fig. 2 is a side elevation and Fig. 3 is an end elevation of the improved machine. Fig. 4 is a horizontal sectional view on the line 4—4 of Fig. 2. Fig. 5 is a perspective view of a matrix.

Similar letters of reference in the several figures indicate the same parts.

The frame of the machine is constructed in two sections A, A′, designed to furnish support for the various operating devices and provide a closed chamber within which the abrading or cutting devices are arranged to operate in the presence of a liquid, such as naphtha. Thus the two sections A A′ are hollowed out centrally to form a closed chamber or cavity B, and on the parting line are furnished with two sets of bearings C C′ for the reception of two spindles each carrying two abrading tools or surfaces located within said chamber B. The upper section A′ carries a detachable sight tube B′ closed at its upper end and in open communication through its lower end with the interior chamber B, the aperture in the section serving as a filling orifice for charging the chamber with naphtha or other liquid of low surface tension.

Two sets of spindles are mounted in parallel relation in the bearings C C′ the outer end of one member of each set beyond the driving pulleys, being supported in bearings mounted upon section A of the frame, to afford additional support and thus insure steadiness in action. As the two sets of spindles are substantially identical in construction a description of one will suffice for both. Each set of spindles includes a spindle D mounted in bearing C and a spindle F mounted in bearing C′ in axial alinement. The proximate ends of the two spindles are formed or provided with heads for the reception of annular grinding disks E E′ and these are connected to rotate in unison and at the same time permit axial adjustment, by a key or collar D^6, angular in cross section, attached to one spindle D and projecting into an angular seat in the opposite spindle E. The spindle D is perforated axially for the passage of a rod D′ provided with a micrometer thread D^2 engaging a complementary thread in section D and carrying on its outer end a pointer D^5 coöperating with a graduated disk or collar D^4 fast on said spindle D. The inner end D^3 of rod D′ is extended beyond the head of section D and is received within an axial recess formed in the end of spindle F and engaging a hardened steel plug F^2 contained therein. The purpose had in view in locating the micrometer screw near the inner end of rod D is to bring it in close proximity to the disks so that changes in temperature will exercise a minimum influence upon the adjustments made. The driving pulley G is secured to spindle E and a spring G′ is applied to said section in a manner to hold and maintain the latter against rod D′, to which end said spring is located within a sleeve formed on the side of the pulley and is interposed between the latter and a loose sleeve engaging the outer bearing.

The cutting or abrading disks E, E, are formed of metal, preferably steel, their operating faces being formed true and charged with powdered diamond or equivalent material as by rolling or pressing the same into and upon the surface so as to partially or wholly embed the particles therein leaving the sharp cutting points or faces exposed and said cutters are arranged to operate within the chamber B where they are wholly or partially immersed in the liquid contained therein, said liquid being of a character possessing a low surface tension, such as naphtha, so that during the rapid rotation of the disks surface contact will be insured and a constant washing action will be induced whereby the loose particles of the abrading and abraded material will be constantly removed from the surface operated upon, thus not only prolonging the life of the grinding disks but preventing the sharp cutting particles from becoming embedded in the surface of the matrix to operate, at a subsequent stage, as active agents in promoting the wear of the finished matrices when associated together in the die case of the casting machine. It has been discovered that a liquid of low surface tension, such as naphtha, when thus fully supplied to the rapidly revolving disks exercises an effective washing action for the removal of loose particles, such as is im-

possible to be attained with water or other fluids of high surface tension, thereby greatly increasing or prolonging the life of the grinding surface. This is presumably accounted for upon the theory that when the charged disks are rotated at the high rates of speed to which they are subjected (1500 to 2000 revolutions per minute) a liquid of high surface tension, such as water, is not permitted to reach the surface of the grinder and penetrate between it and the adhering particles, but is expelled therefrom by centrifugal action, whereas a liquid of low surface tension, such as naphtha, not being affected in the same degree by centrifugal action, can and does make contact with the rapidly moving surface so as to exercise an effective washing action whereby the adhering particles are removed, to expose the cutting edges of the embedded diamond. Whatever the theory, it has been demonstrated in practical operation that whereas the disks running in water require recharging with diamond dust after about a weeks use, when running in naphtha they can be used effectively for about nine months without recharging, thereby effecting a great saving both in time and material.

Spindle D is supported by its bearing against longitudinal motion while spindle F is free to move longitudinally in its bearings, but is held in adjusted position, that is against rod D′ by the yielding pressure of spring G′. This rod D′ and its connections furnishes a micrometer adjustment whereby the distance between the proximate faces of disks E E′ may be accurately adjusted and determined, the readings in the present instance representing ten thousandths of an inch. In order to properly present and manipulate the matrices the following arrangement has been devised:—

The matrix or similar article to be operated upon is presented to and passed between the revolving disks within the closed chamber B by means of a carrier H, which, in the present instance, takes the form of a flat bar, slightly less in width than a finished matrix and carried in slots or ways formed in the upper section A′ of the frame. Extending transversely of the bar H is a slot or opening H′ of a size and shape adapted to receive the matrix, care being taken that its bottom or supporting surface is at right angles to the cutting faces of the disks, said opening H′ being so located or positioned that when the bar is at one extreme, say the left in Figs. 1 and 2, it will register with a horizontal slot or way A^5 in front of the frame, and when at the opposite extreme it will register with a similar slot or way at the rear of the frame. A seat is formed in the frame for the reception of one end of a galley K containing a supply of blank matrices, and a plunger A^6 working in slot A^5 serves for transferring the lower matrix from the galley to the opening H′ in the carrier H. The delivery slot at the rear of the frame is provided with a seat for one end of a horizontally disposed galley K′ and opposite the latter is arranged a pusher L acting through the carrier to eject the finished matrix and deliver it to the galley K′.

The two galleys K K′ are or may be identical in construction, so that they may be used interchangeably at the feeding and delivery ends of the machine, for which purpose one end is furnished with a transverse slot for the passage of plunger A^6, while the opposite end is open for the reception of the finished matrices.

In order that the rear pusher L may be operated from the front of the machine it is connected by a pin L^4 to a lever L′, the latter pivotally supported at L^2 and provided with a handle L^3.

The operation of the machine is as follows:—The two sets of grinding disks are adjusted so that the members of the first pair, that nearest the delivery galley, will stand, approximately, about .0001 of an inch farther apart than the second pair, which latter are set to coincide with the desired width of the finished matrix, hence operate to remove about one ten thousandth of an inch from the sides of the matrix. The chamber B is charged with naphtha and power is applied to rotate the disks. The galley K, filled with matrices, is placed in position with its transverse opening opposite plunger A^5, and an empty galley is seated with its open end opposite plunger L. The matrix carrier H being withdrawn until its slot H′ is opposite the delivery slot in galley K, the operator presses upon pusher A^6 thus driving the bottom matrix into the carrier, which latter is then pushed forward, thus passing the matrix successively between the two pairs of disks E E′ and advancing it to a position opposite gal ley K′, whereupon pusher L is advanced to drive the matrix into said galley. The carrier is withdrawn and the cycle of operations repeated until the galley K is emptied. In this way two opposite sides of the matrices are trued and finished to gage, after which the galleys K K′ are transposed and the operations are repeated with respect to the unfinished sides of the matrix, which by the transposition of galleys are now changed from horizontal to vertical planes so as to be properly presented to the disks.

It is evident that if the extreme degree of accuracy provided for is not required a single pair of grinding disks may be employed for the purpose, both disks being mounted upon the same shaft or one on each shaft, in which latter case or when it is desired to dress but one surface of the article a plain non grinding disk may be substituted for one of the pair of disks, or a support may be provided which, while capable of adjustment relatively to the accompanying grinding disk, is prevented from rotating, as for example, by the substitution of a non-grinding for the grinding disk E, the omission of key D^6, and the application of a holding screw or clamp to spindle section D.

The term "diamond dust" as used in the claims, is intended to include equivalent abrading materials.

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

1. In a grinding machine of the class described, a rotary grinder charged with diamond dust and having its abrading surface wholly or partially immersed in a liquid of low surface tension.

2. In a grinding machine the combination with a closed chamber containing a fluid of low surface tension, of a rotary grinding wheel operating within said chamber.

3. In a grinding machine the combination of a closed chamber containing a liquid of low surface tension, of two rotating grinding disks working within said chamber and means for accurately positioning the opposed grinding surface.

4. In a grinding machine the combination with a closed liquid chamber opposite grinding disks contained therein and means for regulating and determining the interval between the operating surfaces of said disks, of means within said closed chamber for feeding the blanks between the opposing faces of said disks.

5. In a grinding machine the combination with a closed chamber containing a fluid of low surface tension, of a metal grinding disk charged with diamond powder and operating within said chamber and the liquid contained therein and means for presenting the article to be ground.

6. In a grinding machine the combination of the following elements, to wit; two rotating spindles whose proximate ends are each furnished with a grinding or cutting disk; adjusting devices carried by one of said spindles and engaging the opposite spindle, to determine the interval between the disks; an elastic compression device operating to draw the two disks together; and means for rotating said spindles.

7. In a grinding machine the combination of the following elements, to wit; two spindles in axial alinement and each carrying a grinding disk; a rod extending axially through one of said spindles and engaging the opposite spindle, said rod being provided with a micrometer adjustment; a spring operating to maintain said opposite spindle in contact with the rod; and a coupling connecting the proximate ends of the two spindles, to cause them to rotate in unison and permit relative adjustment.

8. In a grinding machine the combination of the following elements, to wit; two disk carrying spindles arranged end to end; and an adjusting device interposed between and engaging the proximate ends of the spindles; substantially as described.

9. In a grinding machine, the combination of the following elements, to wit; two disk carrying spindles arranged end to end; and an adjusting device interposed between and engaging the proximate ends of the spindles, said adjusting device being extended through one of the spindles to permit manipulation thereof.

10. In a grinding machine the combination of the following elements, to wit; a closed chamber containing a liquid of low surface tension; a pair of relatively adjustable disks revolving in said chamber; and a sliding carrier traversing said chamber in a plane intermediate the disks.

11. In a grinding machine and in combination with a rotary grinder and a reciprocating carrier, of a feeding galley from which the blanks are delivered to the carrier and a receiving galley into which the blanks are discharged in a relation at right angles to that which they previously occupied in the feeding galley; substantially as described.

12. In a grinding machine the combination with a rotary grinder and a reciprocating carrier, of a feeding galley presenting a lateral discharge opening to the carrier, and a receiving galley presenting a longitudinal receiving opening to the carrier; substantially as described.

13. In a grinding machine the combination with a rotary grinder and a reciprocating carrier, of a feeding galley provided with a lateral discharge opening, a plunger operating transversely of said galley, a receiving galley disposed at right angles to the feeding galley, and a plunger operating longitudinally of the receiving galley; substantially as described.

14. In a grinding machine, the combination of the following elements, to wit; a frame provided with a closed chamber; a plurality of pairs of grinding disks arranged in succession within said chamber; means exterior to said chamber for effecting the relative adjustment of the members of each pair of grinding disks; a carrier reciprocating in a plane intermediate the grinding disks and provided with a blank supporting opening; a galley detachably attached to the frame in front of the chamber and provided with a lateral discharge opening; a way or channel opposite said discharge opening; a plunger traversing said way or channel; a second galley detachably secured to the frame in rear of the chamber and communicating with a way or channel in the frame and a second plunger traversing said last named way or channel.

15. In a grinding machine the combination of the following elements, to wit; a rotating spindle supported in bearings against longitudinal displacement and provided at one end with a grinding disk and at the other end with an index wheel; a threaded rod engaging said spindle and extending longitudinally therethrough, said rod carrying a pointer coöperating with the index wheel; a second spindle carrying a grinding disk and supported in bearings in axial alinement with the first named spindle and capable of longitudinal movement in said bearings; a plug or bearing carried by said second spindle for engaging the end of the rod; a collar or key engaging the proximate ends of the two spindles; a driving pulley mounted upon the longitudinally movable spindle; and a spring for advancing said last named spindle.

16. In a grinding machine, the combination of the following elements, to wit; a frame formed of upper and lower sections each provided with a cavity or recess forming part of a closed chamber and with bearings located on the parting line; spindles mounted in said bearings and provided with grinding disks within the chamber; a carrier fitted to reciprocate in bearings in opposite walls of the chamber; ways or channels communicating with the bearing for the carrier at opposite ends of the chamber; plungers operating in said ways; and removable and interchangeable galleys fitted to said ways.

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Witnesses:
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