No. 637,362. Patented Nov. 21, 1899.

J. T. TREES.

PAINT MILL.

(Application filed Mar. 17, 1899.)

(No Model.) 3 Sheets—Sheet 1.

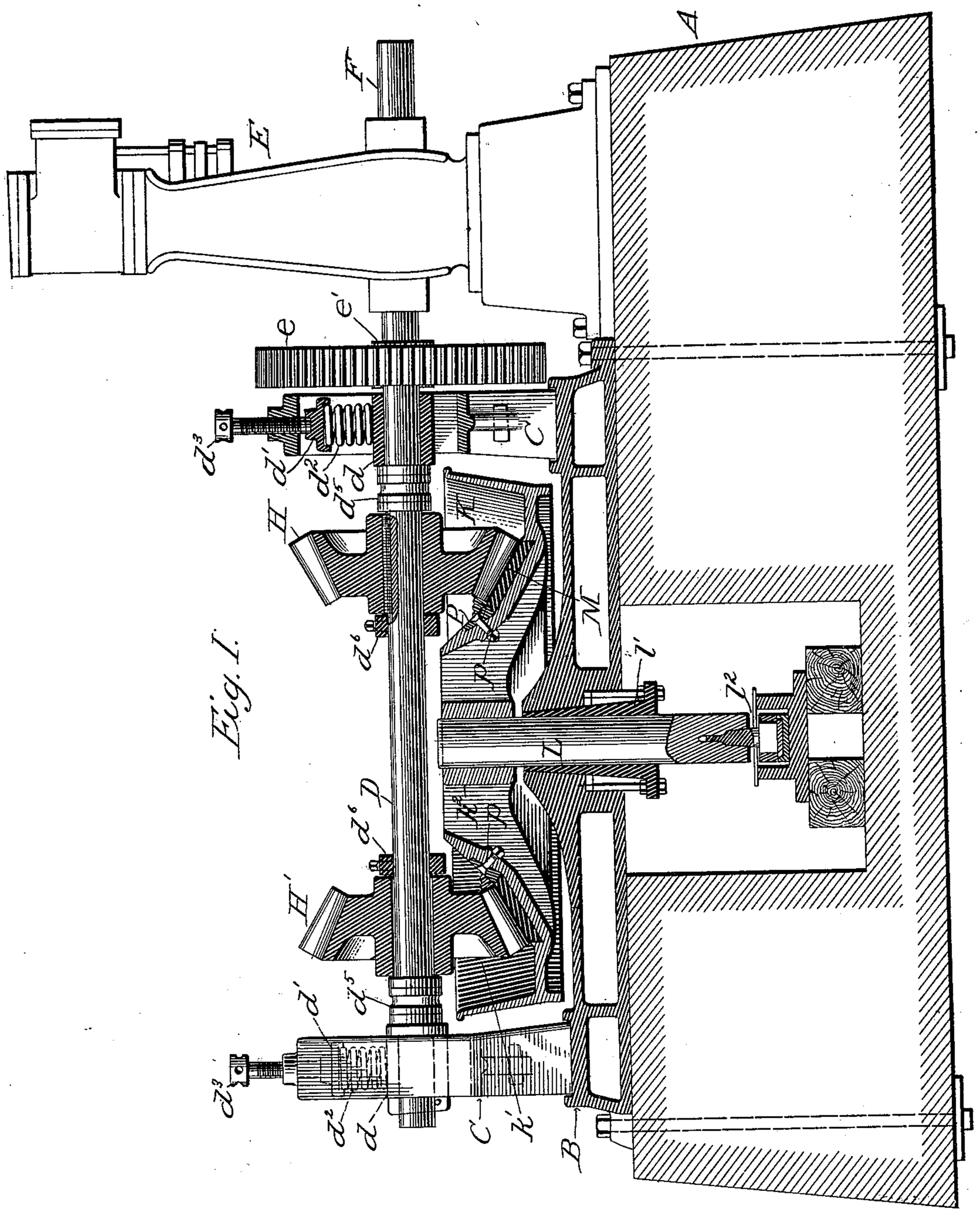

Fig. 1.

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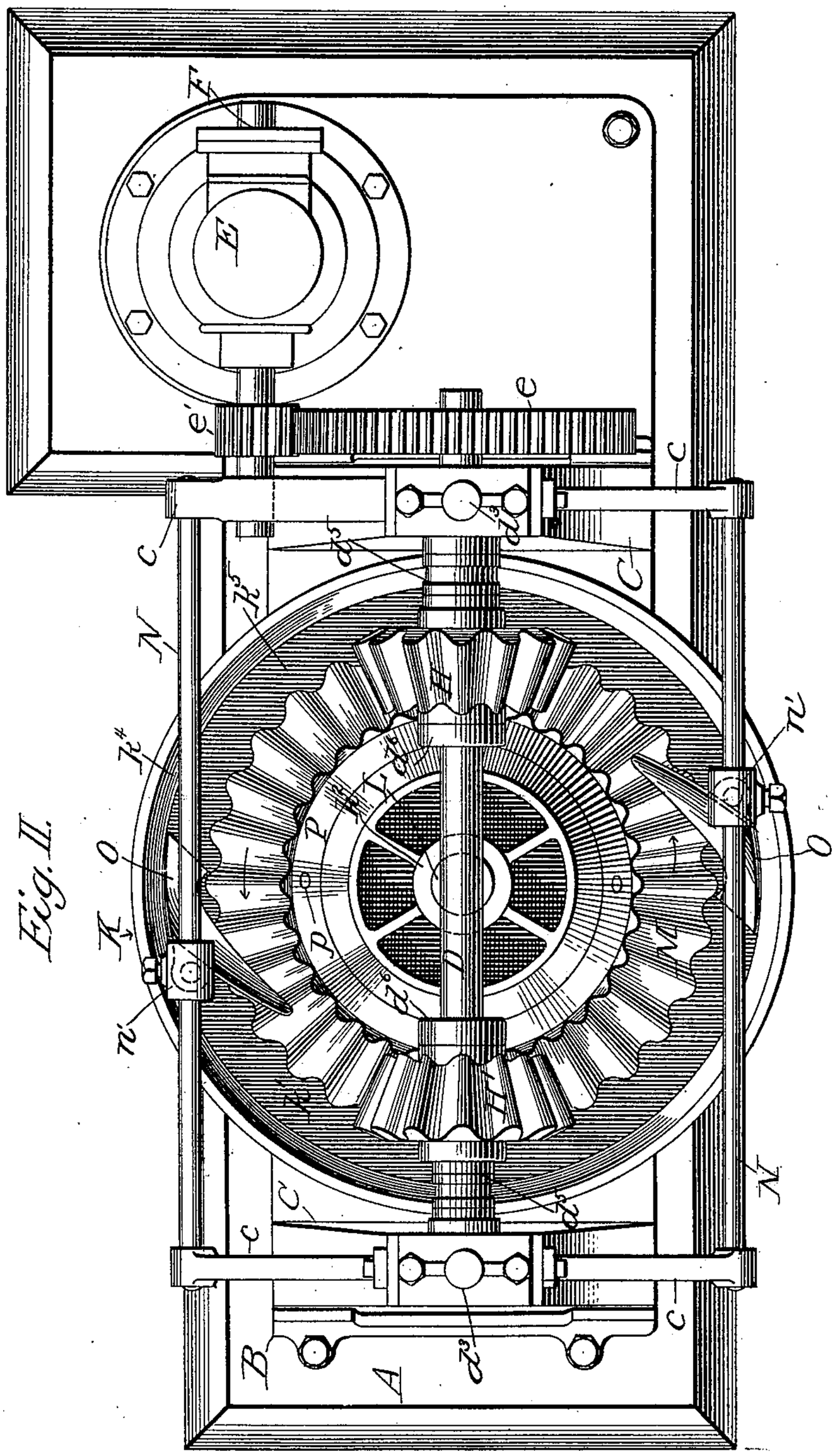

Fig. II.

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Fig. III.

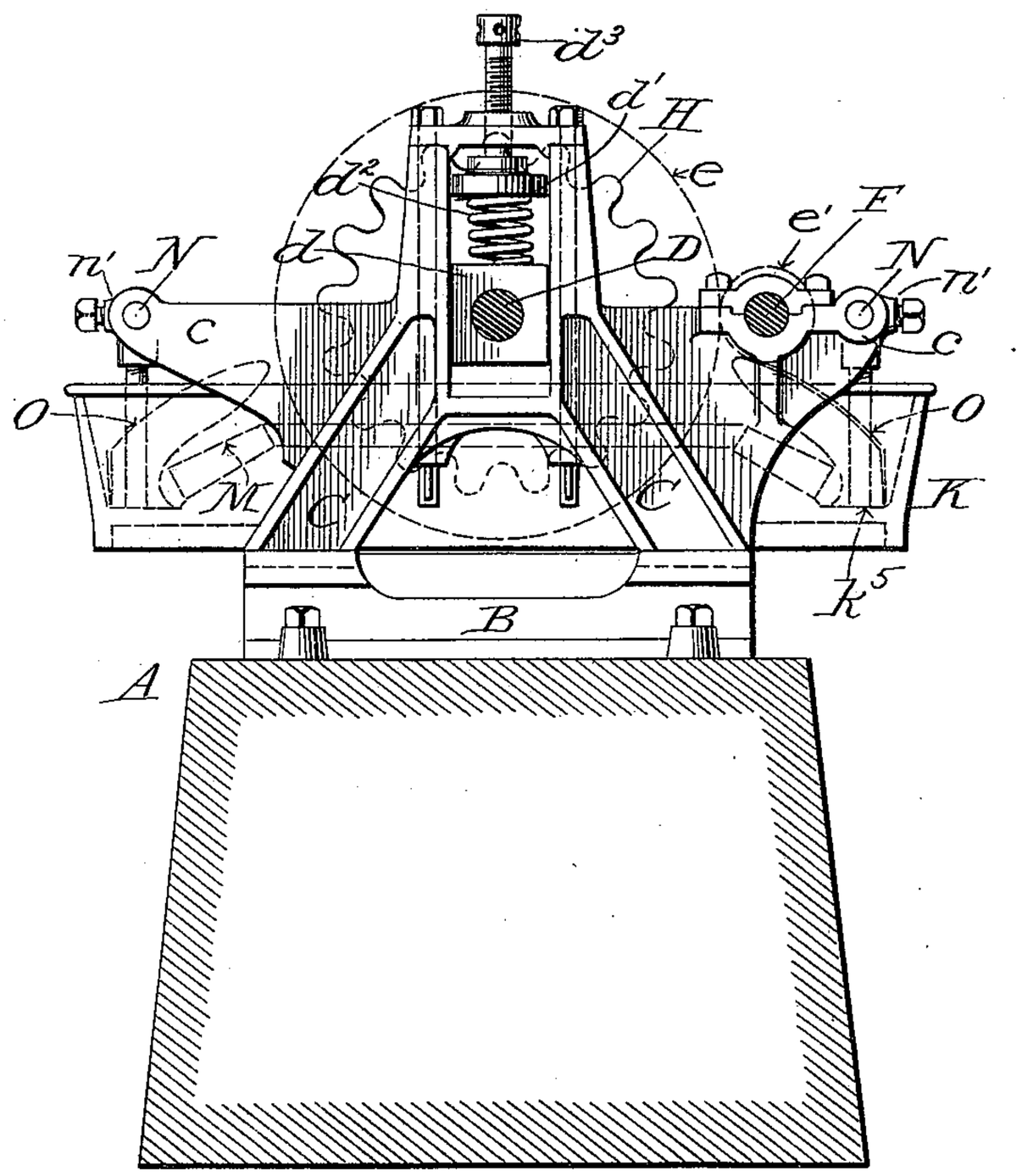
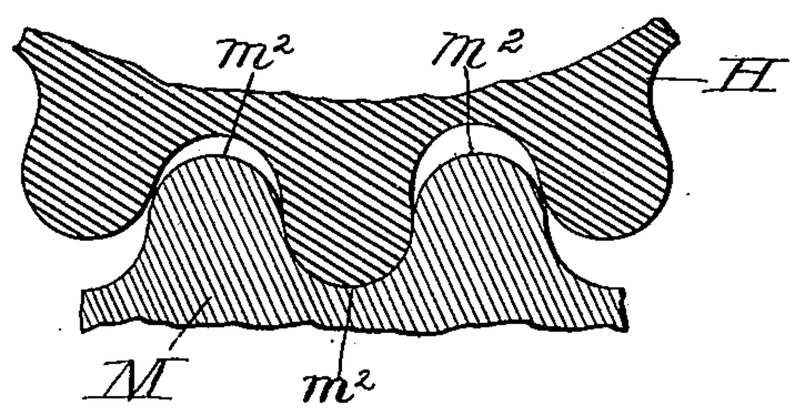


Fig. IV.



Witnesses;
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UNITED STATES PATENT OFFICE.

JOSEPH THOMAS TREES, OF McKEESPORT, PENNSYLVANIA.

PAINT-MILL.

SPECIFICATION forming part of Letters Patent No. 637,362, dated November 21, 1899.

Application filed March 17, 1899. Serial No. 709,451. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH THOMAS TREES, a citizen of the United States, residing at McKeesport, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Paint-Mills; 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.

This invention relates to improvements in paint-mills, but more particularly to that type in which the pigment to be pulverized is ground in rotating grinding-pans under rollers. It is well known that in machines of this character it is difficult to reduce the pigments to a fine powder, owing not only to the slight amount of grinding-surface between the pan and rollers, but also to the continual slipping away of the material from under the rollers.

It is the object of my invention to provide a paint-mill of the above-named character having greatly-increased grinding-surface, and one in which the pigments will be easily caught between the grinding-surfaces and positively prevented from slipping away, thus insuring quick and thorough comminution, and, further, while attaining this result it is my object to reduce the number of parts of the machine, employing simpler mechanism than heretofore in machines for grinding pigments.

With these and other objects in view my invention consists in certain novel features of construction and combinations of parts, which will first be more particularly described with reference to the accompanying drawings, forming a part of this specification, and then pointed out in the claims at the end of the description.

In the drawings, in which similar parts are denoted by similar letters of reference, Figure I represents in front elevation and principally in vertical cross-section a paint-mill embodying my invention. Fig. II is a top view of the same. Fig. III is an end view of the machine, and Fig. IV a detail view representing in cross-section a portion of the grinding-surfaces.

The letter A in the drawings denotes a suitable support or foundation for the working parts of the machine, B a bed-plate suitably mounted thereon, and C C standards erected at each end of the bed-plate, which, together with said bed-plate, constitute the framework of the machine. The standards C C are preferably forked or bifurcated in their lower portions, slotted in their upper portions, and provided in said slots with movable bearing-blocks d d, as seen more clearly in Fig. III. Said bearing-blocks d d are shown as downwardly pressed by spiral springs d^2 d^2, the tension of which may be regulated by the screw-bolts d^3 d^3, whose lower ends are swiveled in the blocks d' on said springs. Journaled in said bearings d d and supported by the standards C C is a horizontal actuating-shaft D, to which power may be transmitted from a suitable engine or motor E. As represented in the drawings, the power is transmitted from the shaft F to the shaft D by means of the gear-wheel e and pinion e'.

The actuating-shaft D is provided with two bevel gear-wheels H H′, one of which, as H, is keyed to the shaft and transmits motion to the grinding-pan, the other, as H′, being loose on the shaft for a purpose hereinafter stated. Suitable shoulders d^5 d^5 are provided on the shaft D, abutting against the hubs of the wheels H H′, to secure said wheels against endwise movement or thrust, and on the opposite side of said hubs are placed rings or sleeves d^6 d^6 to hold said wheels at that side.

The grinding-pan K is preferably circular in form, having a central hub k^2 keyed to a vertical shaft L and a circular trough portion k' connected by radial arms with the central hub k^2. The shaft L, which is arranged beneath and at right angles to the horizontal shaft D, may be journaled in any suitable manner in the bed-plate and base or support of the machine. As shown, it is supported in bearings l' in the bed-plate and a step-bearing l^2 at its foot. Thus the grinding-pan K will rotate with the shaft L; but, if desired, said shaft may be stationary in its bearings and the pan made to rotate thereon as an axle. The trough portion of the grinding-pan is provided with an annular corrugated surface or gear-wheel M, in gear with the toothed gear-wheels H H′ on the shaft D, so that the gearing in the trough of the pan constitutes, with

each of the toothed wheels H and H′, a system of inclined corrugated or bevel gearing, which is peculiarly effective in grinding the material for paints. The teeth of the toothed wheels H and H′ and of the wheel M, which gears therewith, are preferably rounded or circular, as shown more clearly in Fig. IV, and the spaces between the teeth are made to correspond in both size and shape, so as to fit the teeth, as at m^2, Fig. IV.

In Figs. II and III, *c c* denote arms on the standards C C, extending therefrom outwardly at right angles to the shaft D, said arms supporting horizontally-disposed rods N N above the pan K on each side of the shaft D parallel with the same and at a distance therefrom slightly less than the radius of the pan. From each rod N and adjustable thereon, as at n', depends a collector O, of metal or other material, which may have the form of the moldboard of a plow, as shown, and is adapted to operate on the same principle. The collectors O O are of such shape, width, and length as to adapt their outer edges to lie just within the inner circumference of the rim of the pan, with their points grazing the lower surface of the rim and the smooth bottom surface of the pan or trough of the pan—that is, that portion thereof which lies between the gearing M and rim k^4.

The operation of the machine is as follows: A rotary movement of the shaft D, imparted by the engine or motor E, will rotate the toothed wheel H, which, being keyed to the shaft D in gear with the gearing M of the pan K, thereby causes the pan to rotate and with it the shaft L, and the gear-wheel M of the pan being in gear with the toothed wheel H′, which is loose on the shaft D, causes the same to rotate in a direction opposite to that of the wheel H. The material to be pulverized is placed in the grinding-pan, and a part falling on the corrugated surface M is caught between the same and the opposed similarly-toothed surface of the peripheries of the wheels H and H′, and thereby quickly ground to a fine powder without liability of slipping from the grinding-surface. The efficiency and rapidity of the grinding process are increased by the described form of gear-teeth. Owing to the rounded teeth fitting into the correspondingly-rounded spaces each tooth performs the function of grinding throughout its entire contact with another tooth. Whatever material remains in the smooth portion of the trough of the pan k^5 or falls thereon from the gearing M is gathered up by the plow-shaped collectors O O as the pan revolves and thrown upon the gear-teeth M in time to come under the action of the teeth of the next gear-wheel H or H′, as the case may be.

The spiral springs d^2 d^2, which are placed above the bearing-blocks in which the shaft D is journaled, counterbalance any tendency of uneven motion of the pan or injurious adaptation of the toothed wheels H H′ with the wheel M and also prevent any injury which might be caused by reason of large or hard pieces of pigment or impurities in the same coming between the grinding-surfaces.

It will be seen that in my improved machine instead of attempting to grind the material between smooth rollers I cause the material to come between the teeth of gear-wheels having peculiarly-formed teeth or corrugations, thus not only increasing to a great extent the grinding-surface, but also positively preventing the liability of the material slipping from under the crushing-rollers, and by the described shape of the teeth and intervening spaces the grinding-surface is further increased, as well as the thoroughness and effectiveness of the comminution. Moreover, simplicity of design, strength of parts, and cheapness of construction are attained by employing the driving mechanism to perform the grinding function, whereas heretofore separate mechanism has been employed to drive the grinding-pan and separate mechanism to drive the rollers above the pan, thus increasing the height or size of the machine as well as cost of manufacture.

It is to be understood that while my invention relates to machines for grinding pigments it may be embodied in machines for other uses and is susceptible of various modifications in form and construction without departing from the spirit and scope of the invention.

I have shown the toothed inner surface of the pan or the bevel-wheel therein as being formed separate therefrom and fitted into an annular recess on the inclined surface of the pan and removably secured therein by a key-ring P, which latter may be secured by bolts *p*, as clearly shown in Figs. I and II of the drawings; but, if desired, in some cases the annular inclined toothed surface may be formed integrally with the pan. I also preferably connect the horizontal driving-shaft D with a suitable engine or motor for imparting motion to the cog-wheel which is made fast thereon for imparting motion to the pan, but in some cases it may be found convenient to impart motion to the pan in some other way. I also preferably employ a form of gearing for comminuting the material in which the inclined or beveled teeth on the inner surface of the pan are rounded and contact with similarly-rounded cone-shaped beveled teeth on the cog-wheels in gear therewith, as shown; but I do not desire to limit my invention to this peculiar form of gearing, as other forms may be employed without departing from the spirit or scope of my invention in its broader aspects.

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

1. In a machine of the character described, the combination with the pan provided on the inner surface thereof with an annular toothed or corrugated surface, of a driving-shaft arranged over the pan and provided with a pair

of similarly-toothed wheels in gear with said toothed surface; one of said wheels being fast on the shaft, so as to impart motion to the pan, and the other loose thereon so as to be driven by the pan, substantially as described.

2. In combination with the revolving pan having the annular toothed surface or gear on the inner side thereof, a horizontal shaft mounted in bearings over said pan and provided with a pair of bevel-wheels, one of which is fast thereon so as to revolve with the shaft and the other loose; the said shaft being journaled in vertically-movable spring-pressed bearings, substantially as described.

3. In a paint-mill, a revolving pan having its bottom formed or provided with an inclined annular toothed surface, said teeth being rounded in cross-section substantially as described, in combination with a driving-shaft having thereon a fixed and a loose gear-wheel meshing with said toothed surface of the pan on opposite sides of its center, the teeth of said gear-wheels being rounded and cone-shaped, substantially as described.

4. In combination with the pan having the inclined toothed or corrugated surface and a smooth portion forming a trough-like receptacle for the material, and bevel-wheels in gear with said toothed surface, a collector arranged to operate in close contact with the surface of the pan so as to direct the material from the outer circumferential portion of the pan onto the toothed or corrugated surface thereof in front of the bevel-wheel, substantially as described.

5. In combination with the pan having the toothed or corrugated surface and a smooth portion forming a trough-like receptacle for the material, and bevel-wheels in gear with said toothed surface, collectors arranged to operate in close contact with the surface of the pan so as to direct the material from the outer circumferential portion of the pan onto the toothed or corrugated surface thereof in front of the bevel-wheels, substantially as described.

6. In a paint-mill, a grinding-pan provided with cog-gearing on its inner surface, said gearing in gear with a cog-wheel which actuates the pan and with a loose cog-wheel which is actuated by the pan; the surface between said cog-wheels and cog-gearing constituting the grinding-surface, substantially as described.

7. In a paint-mill, a grinding-pan provided with bevel-gearing, said gearing removably secured in the pan and concentric with the same, substantially as described.

8. In a machine of the character described, the combination of a rotary pan having an internal annular gear constituting a grinding-bed, an intermeshing gear or pinion coöperating with the latter to grind the material in the pan, and driving mechanism applied to the pinion whereby motion is imparted to the pan through the latter, substantially as described.

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

JOSEPH THOMAS TREES.

Witnesses:
W. S. FRYE,
W. J. GERMAN.