

No. 684,547.

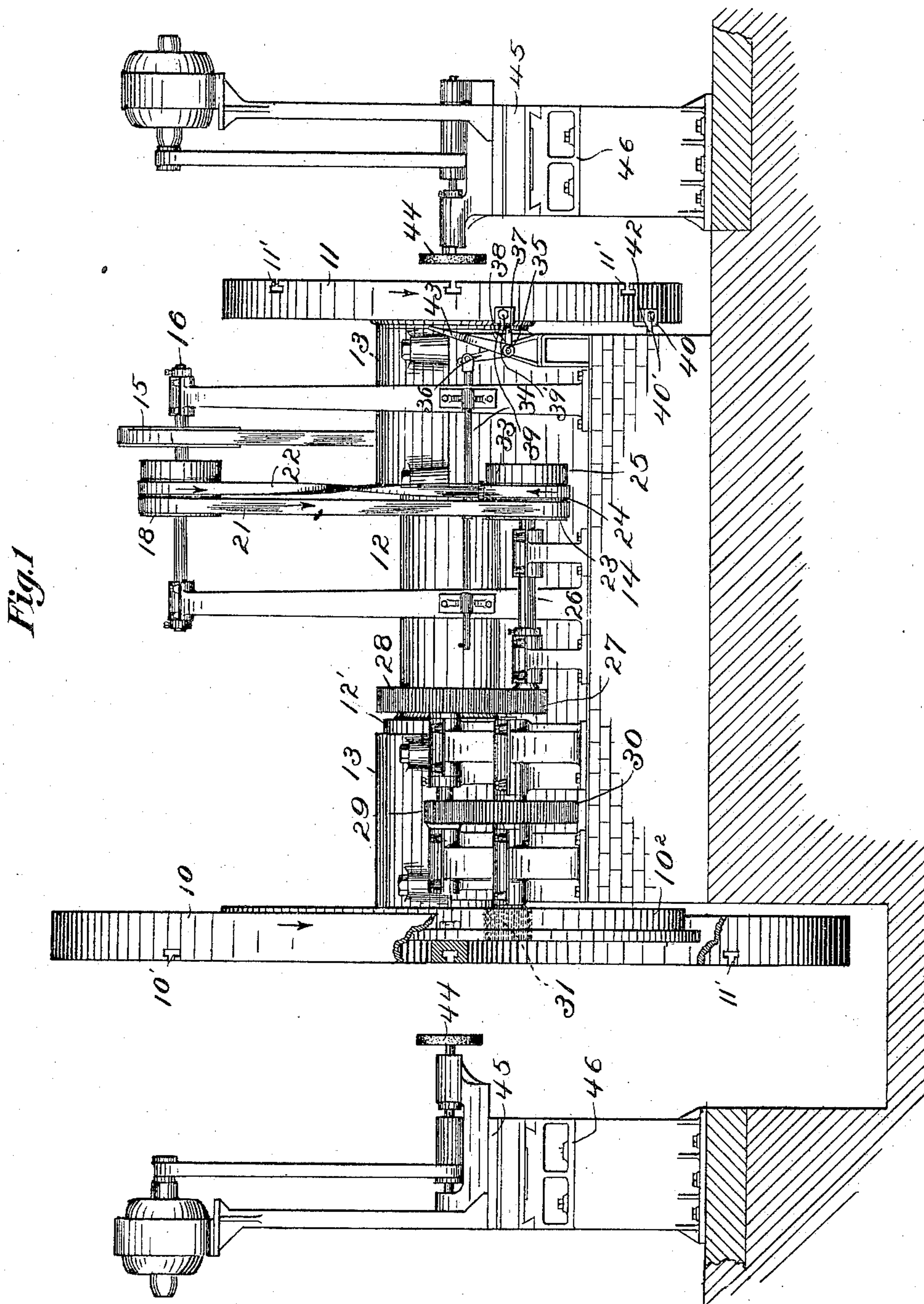
Patented Oct. 15, 1901.

H. D. HIBBARD.
REVERSIBLE GRINDING MACHINE.

(Application filed May 9, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:
H. Jacobs.
Frank Campbell

Henry D. Hibbard. Inventor:

By his Attorney, F. H. Richards.

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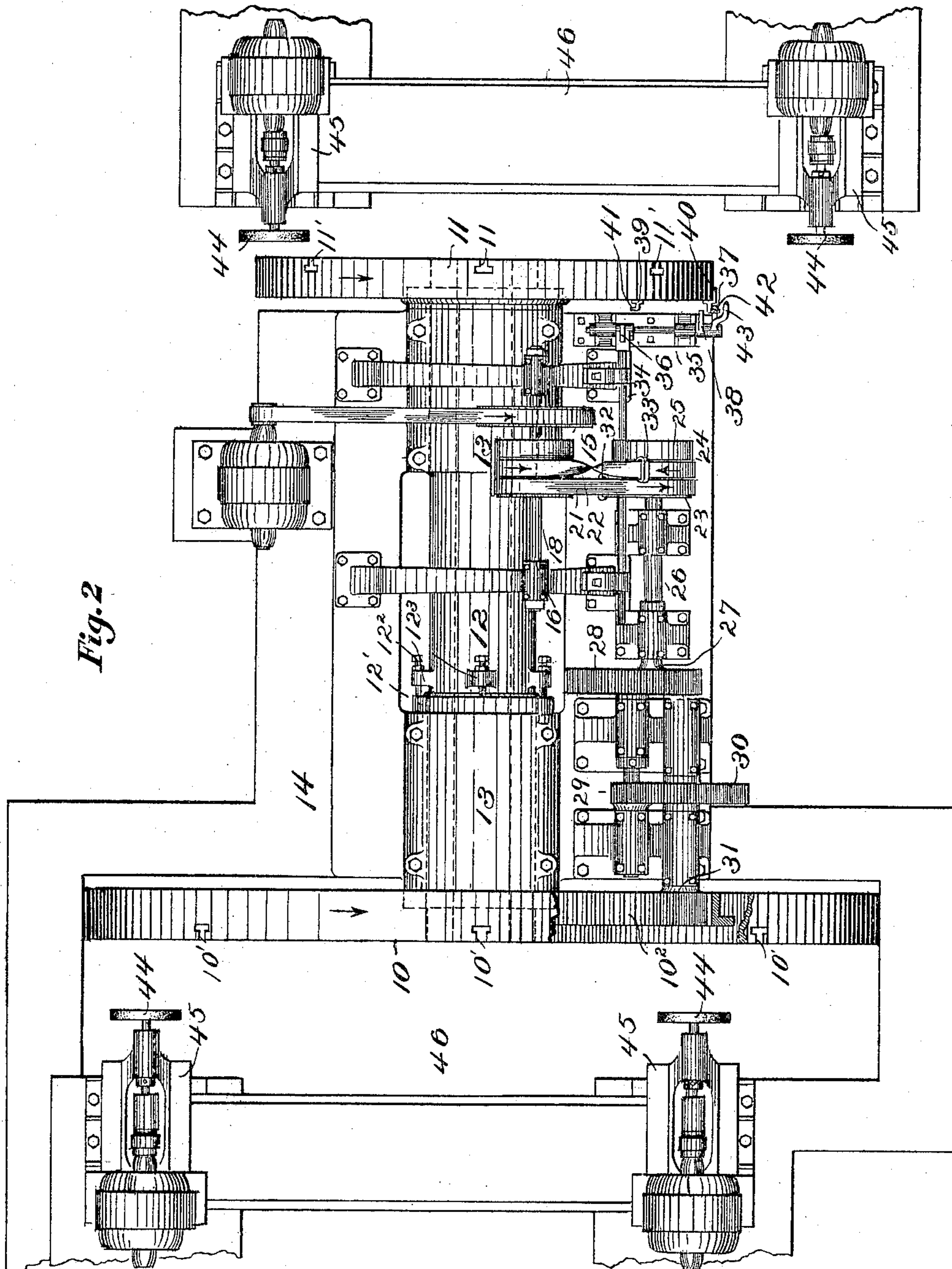
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Fig. 3

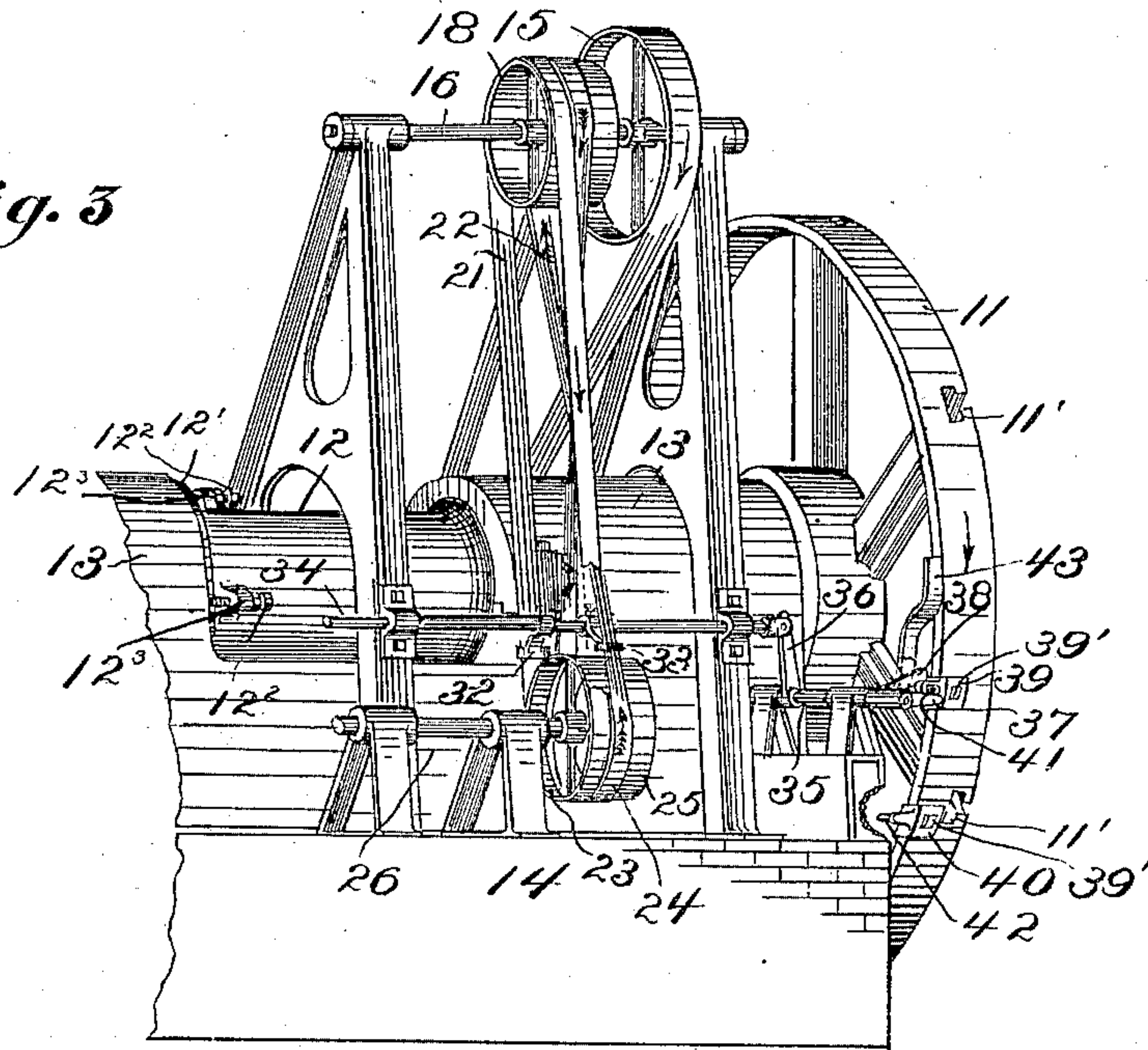


Fig. 4

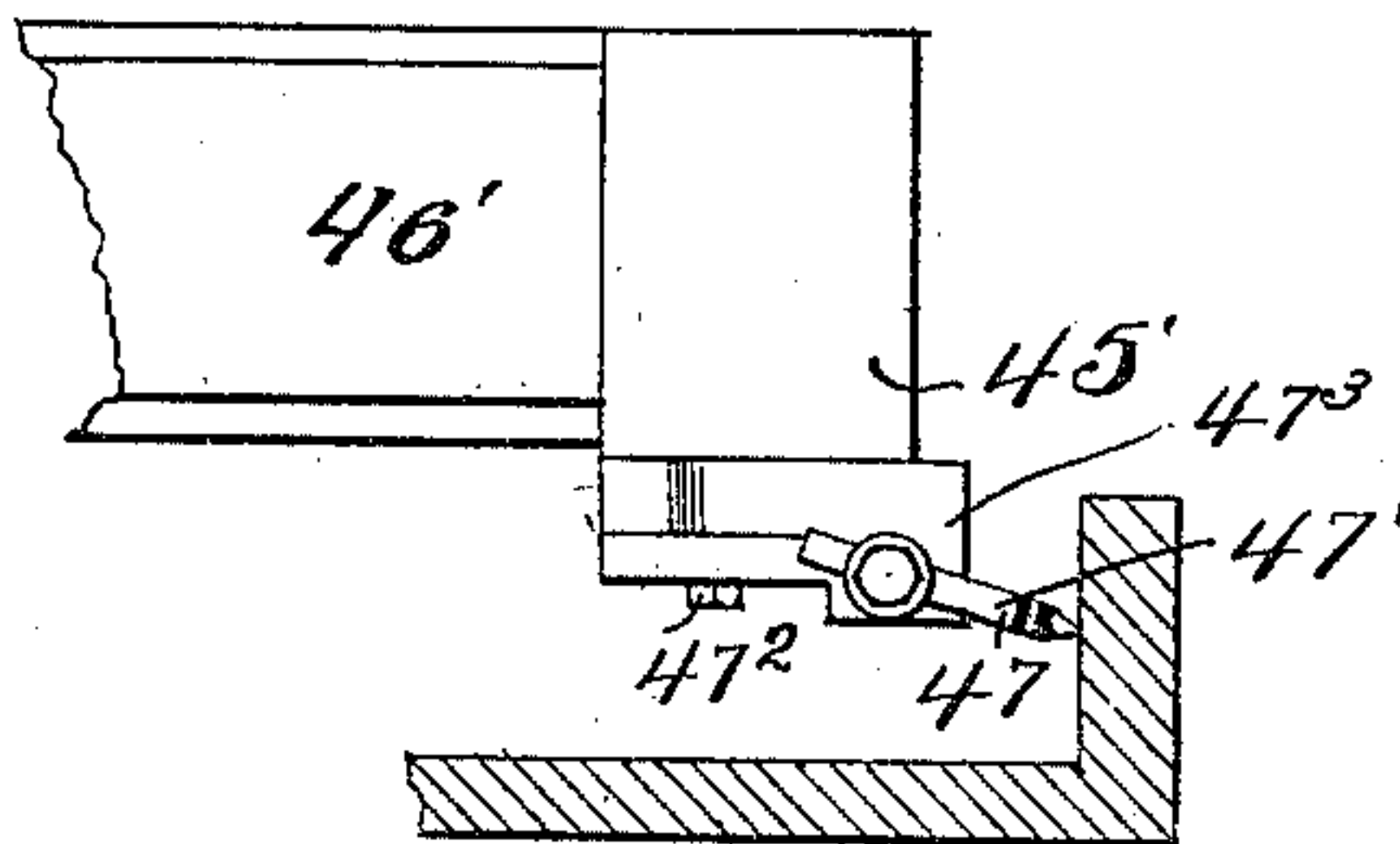
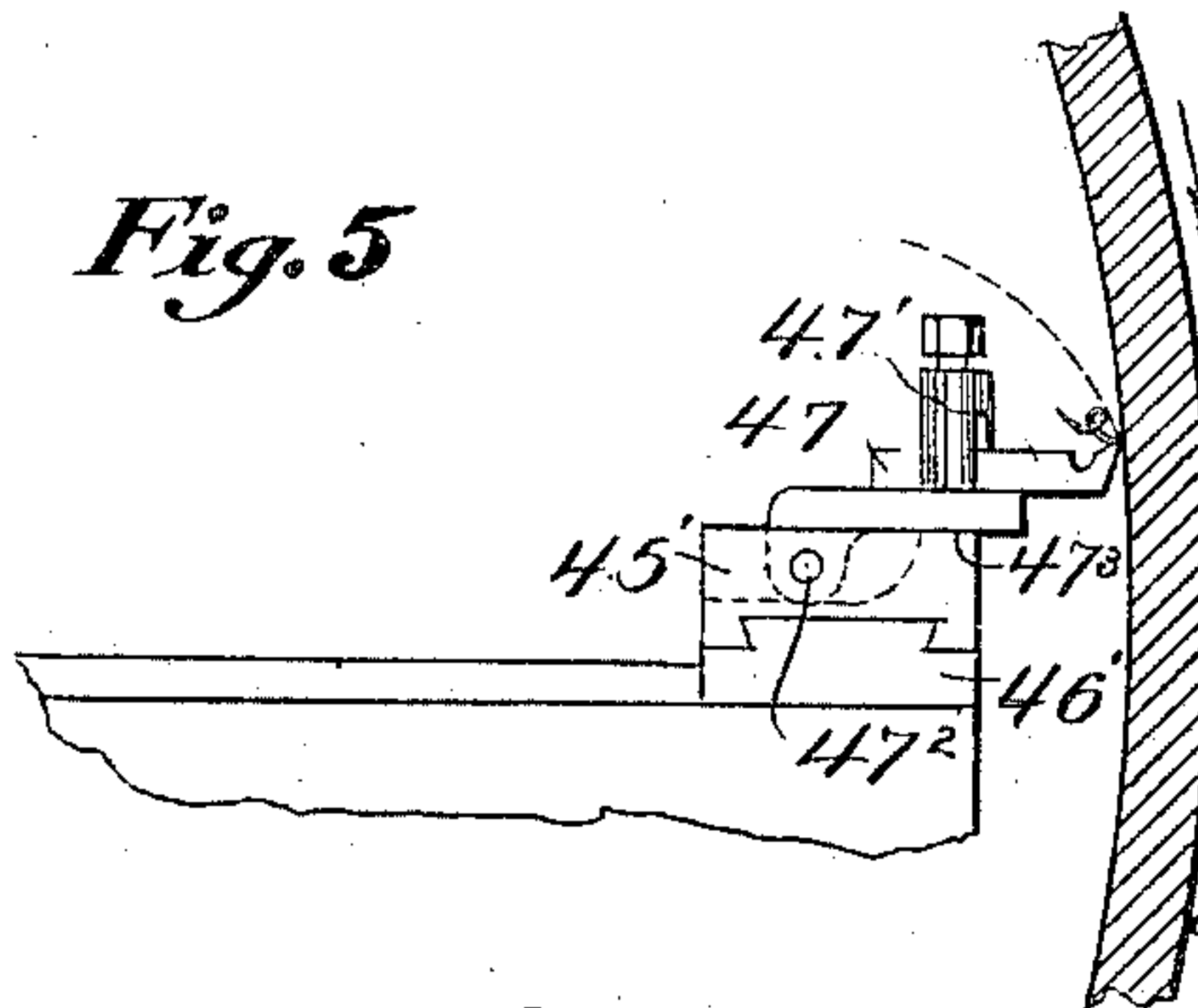


Fig. 5



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UNITED STATES PATENT OFFICE.

HENRY DEMING HIBBARD, OF PLAINFIELD, NEW JERSEY.

REVERSIBLE GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 684,547, dated October 15, 1901.

Application filed May 9, 1901. Serial No. 59,374. (No model)

To all whom it may concern:

Be it known that I, HENRY DEMING HIBBARD, a citizen of the United States, residing in Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Reversible Grinding-Machines, of which the following is a specification.

This invention relates to grinding-machines; and the object of the invention is to provide a grinding or finishing machine having a rotary face-plate capable of adjustable automatic reversal.

A further object of the invention is to provide a grinding-machine wherein the work is carried upon one or more rotary face-plates which may be reversed by automatic adjustable means.

Another object of the invention is to provide a grinding-machine wherein the work is carried upon one or more rotary face-plates which may be reversed by automatic adjustable means, and which grinding may take place at more than one point upon the work; and a still further object of this invention is to provide a grinding-machine wherein the work is carried upon one or more rotary face-plates, and which may be reversed by automatic adjustable means, the grinding operation being continuous, when desired, irrespective of the direction in which the work is being rotated.

The grinding-machine shown herein and described is particularly adapted for use in connection with safes or vaults, and especially to that form of safe or vault which is made of unmachineable metal, such as manganese steel. In the manufacture of safes of manganese steel it is impossible to work the metal by cutting. Consequently it is necessary to work such metal by grinding, this being the only practicable mode known at the present time. When the safe or vault is provided with a circular portion—as, for instance, a doorway—it is necessary at the present time in the grinding of such circular part to carry the tool entirely around such part during each grinding action. Frequently there are imperfections or projecting portions necessary to be removed, which, however, it is impossible to work upon successively except by carrying the tool entirely around the

object being operated upon. In a grinding action it is well known that only a very small portion of metal is removed during each step. Consequently it is a very expensive operation, so that it is necessary to provide means whereby any particular part of the article being ground can be successively treated without the necessity of working entirely around the circular part each time. For this purpose is provided improved means whereby the mechanism which rotates, such as a face-plate carrying the safe or vault or other article to be worked, can be automatically reversed, thereby to rotate the face-plate in different directions and enable the tool to operate over a short portion of the work—as, for instance, a safe or vault—in succession, and for this purpose is provided an improved grinding-machine which comprises in a general way one or more rotary face-plates adapted to carry an object to be operated upon, one of which face-plates carries adjustable means adapted to be located in various positions and cooperating with means for shifting the operating mechanism, and which means in the form shown comprises belt-shifting means suitably connected with the power mechanism or driving mechanism.

In the drawings accompanying and forming a part of this specification, Figure 1 is a side elevation of one form of this improved machine. Fig. 2 is a plan view thereof. Fig. 3 is a perspective view showing a form of reversing device and a face-plate; and Figs. 4 and 5 show the application of a cutting-tool, which may be used in place of a grinding-wheel in some instances.

Similar characters of reference designate corresponding parts in all the figures of the drawings.

In the form of grinding-machine herein shown and described and which may be its preferred form, if desired, the device comprises one or more rotary members, such as face-plates, adapted to carry the article to be worked. Two face-plates 10 11 are shown in the present instance, connected by a shaft 12, supported by some suitable supporting means 13, such as two-part bearings resting upon a suitable bed 14. The power is here shown as applied to a pulley 15, mounted on a shaft 16, carried by bearings supported by

standards, on which shaft is a fast pulley 18, over which run an open and a crossed belt 21 22, respectively, which belts also run over a set of fast and loose pulleys 23, 24, and 25, carried by a shaft 26, having suitable bearings, and which is connected, by means of a chain of gear-wheels 27, 28, 29, 30, and 31, with an integral gear 10², formed on one of the face-plates, as 10. In place of the crossed belt a belt running in the opposite direction could be used, in which case a separate power-shaft similar to shaft 16 would be provided. The belts 21 22 are here shown as adapted to be shifted backward and forward on their fast and loose pulleys by means of belt-shifting means, such as loops 32 33, carried by a reciprocating rod 34 and supported by suitable hangers. A rock-shaft 35, having a crank 36 in engagement with the reciprocating rod of the belt-shifter, is provided at its outer end with arms 37 38. Carried by one of the face-plates (here shown as 11) are clamps 39 40, secured to the flange by means of set-screws 39' 40', respectively. These clamps are respectively provided with projecting fingers or lugs 41 42. In the path of these lugs or fingers 41 42 the arms 37 38 of the rock-shaft are located to alternately be interposed. There is also provided on the rock-shaft 35 a lever 43, provided for manually operating the belt-shifting device. The face-plates are respectively provided with bolt-kerfs 10' 11'. Opposite each face-plate is shown the grinding mechanism, in the present instance comprising two grinding-wheels 44, mounted on carriages 45, slidable upon bed-plates 46. At times it may be found desirable in operating upon certain classes of work—for instance, when the article to be treated is formed of other than unmachineable metal—to substitute a cutter for one or more of the grinding-wheels, and in Figs. 4 and 5 a convenient form of cutter is shown mounted on a carriage 45' and adapted to slide on the bed-plate 46' and comprises a tool 47, set in a tool-post 47', pivoted at 47², and when in work bearing against a support 47³. This organization permits the tool to freely drag over the work when running in one direction and to cut when running in the opposite direction. When a cutting-tool is used, it may be desirable to drive backward at a higher speed than when cutting. In this case each belt would have its own tight and loose pulley mounted on the shaft 26, the proportions of the pulleys being made suitable to provide for the desired speed.

The operation of the machine is as follows: Work being bolted on either or both of the face-plates by means of bolts and bolt-kerfs in the usual manner and the power applied, the belts being in the position indicated in Fig. 2 and moving in the direction indicated by the several arrows, the face-plates will rotate in the direction of the arrows thereon. The lug or finger 41 will come in engagement with the arm 37, which will partially rotate the rock-shaft 35, which through its crank 36

will reciprocate the rod 34 and by means of the belt-shifting loops 32 33 shift the crossed belt 22 onto the fast pulleys 20 25 and at the same time shift the open belt 21 off of the fast pulleys 18 23 and onto the loose pulleys 19 24, which will, operating through shaft 26 and chain of gears 27, 28, 29, 30, 31, and 10², change the direction of rotation of the face-plates. When the lug 41 engaged the arm 37, it rocked the shaft 35 and shifted the arm 38 into the path of the other lug 42, so that it is in position to be engaged by said lug 42 upon the opposite rotation of the face-plates. The clamps 39 and 40, being provided with set-screws or any other suitable clamping means 39' and 40', respectively, may be shifted to any desired point on the flange of the face-plate to adjustably limit the amount of rotation thereof. For the purpose of laterally adjusting the face-plates some convenient means may be employed, and in the drawings such a means is shown, which may comprise a collar 12', loose on the shaft 12 and in contact with one of its bearings and which is adapted to be set against the bearing by set-screws 12², carried by ears 12³ on the shaft, and it will be readily observed that by screwing in the set-screws they will push the collar along the shaft and against the bearing and move the face-plate 10 in the opposite direction. In Fig. 2 the invention has been shown as applied to a grinding-machine having two face-plates each provided with a set of two grinding-wheels; but I do not limit myself to the number of face-plates nor the number or organization of the grinding devices, and although I have shown two face-plates, one being operated upon by the driving mechanism and the other carrying the reversing mechanism, yet the machine may be constructed with but a single face-plate, which may carry the reversing-mechanism-operating devices, or the same may be mounted upon an independent means carried by the shaft of the face-plate or otherwise operated by it.

In the present instance the invention is shown as applied to a grinding-machine, to which it is particularly adapted; but it is to be understood that in practice it may be applied to a finishing-machine.

The various parts of the machine are here shown as operated by electric motors and the reversing means shown as belts running over fast and loose pulleys and operated by a belt-shifter, yet any ordinary and suitable means may be employed for the accomplishment of the same results.

Having described my invention, I claim—

1. In a grinding-machine, the combination, with a rotary face-plate, of driving means therefor, and means controlled by such face-plate for reversing said driving means.

2. In a grinding-machine, the combination of a rotary face-plate; driving means therefor; and means carried by said face-plate for reversing said driving means.

3. In a grinding-machine, the combination,

with a rotary face-plate, of driving means therefor; reversing means for the driving means; and automatic means for reversing the driving means.

5 4. In a grinding-machine, the combination, with a rotary face-plate, of driving means therefor; reversing means for the driving means; and rotary automatic means for reversing the driving means.

10 5. In a grinding-machine, the combination, with a rotary face-plate, of driving means therefor; reversing means for the driving means; and rotary adjustable automatic means for reversing the driving means.

15 6. In a grinding-machine, the combination, with a rotary face-plate, of power-reversing means, and automatic means for reversing said plate at any point in its rotation and comprising means shiftable with the shaft of the
20 face-plate and coöperative with said power-reversing means.

7. In a grinding-machine, the combination, with an adjustable grinding-wheel, of a rotary face-plate adapted to hold and carry the
25 work therefor and having an internal gear; means for imparting rotary motion to said face-plate; and means operative by the face-plate for automatically reversing its motion.

30 8. In a grinding-machine, the combination, with two sets of adjustable grinding-wheels, of axially-mounted face-plates adapted to hold and carry the work therefor; means for imparting rotary motion to the face-plates; and means operated by one of the face-plates
35 for automatically reversing the motion of both.

9. In a grinding-machine, the combination, with a reversible rotary face-plate, of a grinding-wheel operative upon the work carried by
40 the face-plate in either direction of its rotation.

10. In a grinding-machine, the combination, with grinding means, of rotary means adapted to carry the work for the grinding
45 means; means for reversibly operating the work-carrying means; and adjustable automatic means for actuating the reversing means, all organized to permit grinding in both directions of rotation.

50 11. In a grinding-machine, the combina-

tion, with a rotary face-plate adapted to carry the work, of driving means for rotating said plate; reversing means for said driving means; adjustable means for automatically controlling said reversing means; and independ- 55
ently-adjustable grinding means operative upon the work at more than one point simultaneously.

12. In a grinding-machine, the combination, with rotary face-plates independently ca- 60
pable of carrying the work, of driving means for rotating said plates; reversing means for said driving means; adjustable means for automatically controlling said reversing means; and a set of grinding means comprising two 65
or more independent adjustable members operative upon the work of each face-plate at different points thereof respectively.

13. The combination, with a rotary face-plate, of driving means therefor; reversing 70
means for said driving means and embodying a pair of belts, one running in one direction and the other in the opposite direction; and means carried by the face-plate and coöperative with said reversing means for reversing 75
the direction of movement of said plate.

14. The combination, with a shaft, of a pair of rotary face-plates mounted thereon, one of said plates having an internal gear; driv- 80
ing means; gearing connecting said driving means and said internal gear; means for reversing said face-plates and including shiftable belts, one a crossed belt; and adjustable means carried by one of said face-plates for controlling the shifting of said belts. 85

15. The combination, with a shaft, of a pair of face-plates carried thereby and of different diameters, one of said face-plates having an internal gear; driving means; gearing connecting said driving means with said inter- 90
nal gear; reversing means for said driving means and embodying a rock-shaft; and adjustable means carried by one of said face-plates for rocking said shaft, thereby to shift said belts.

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Witnesses:

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