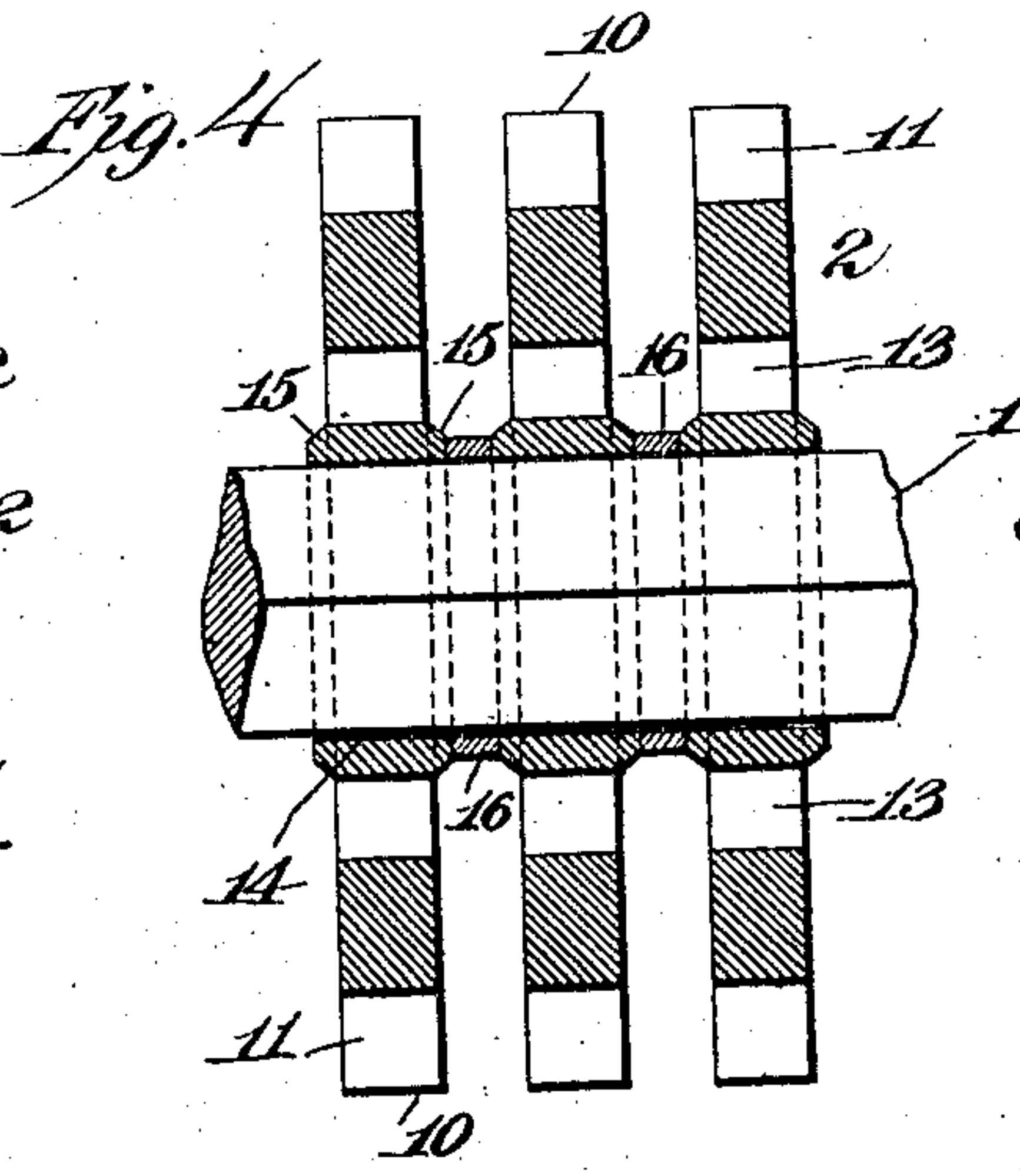
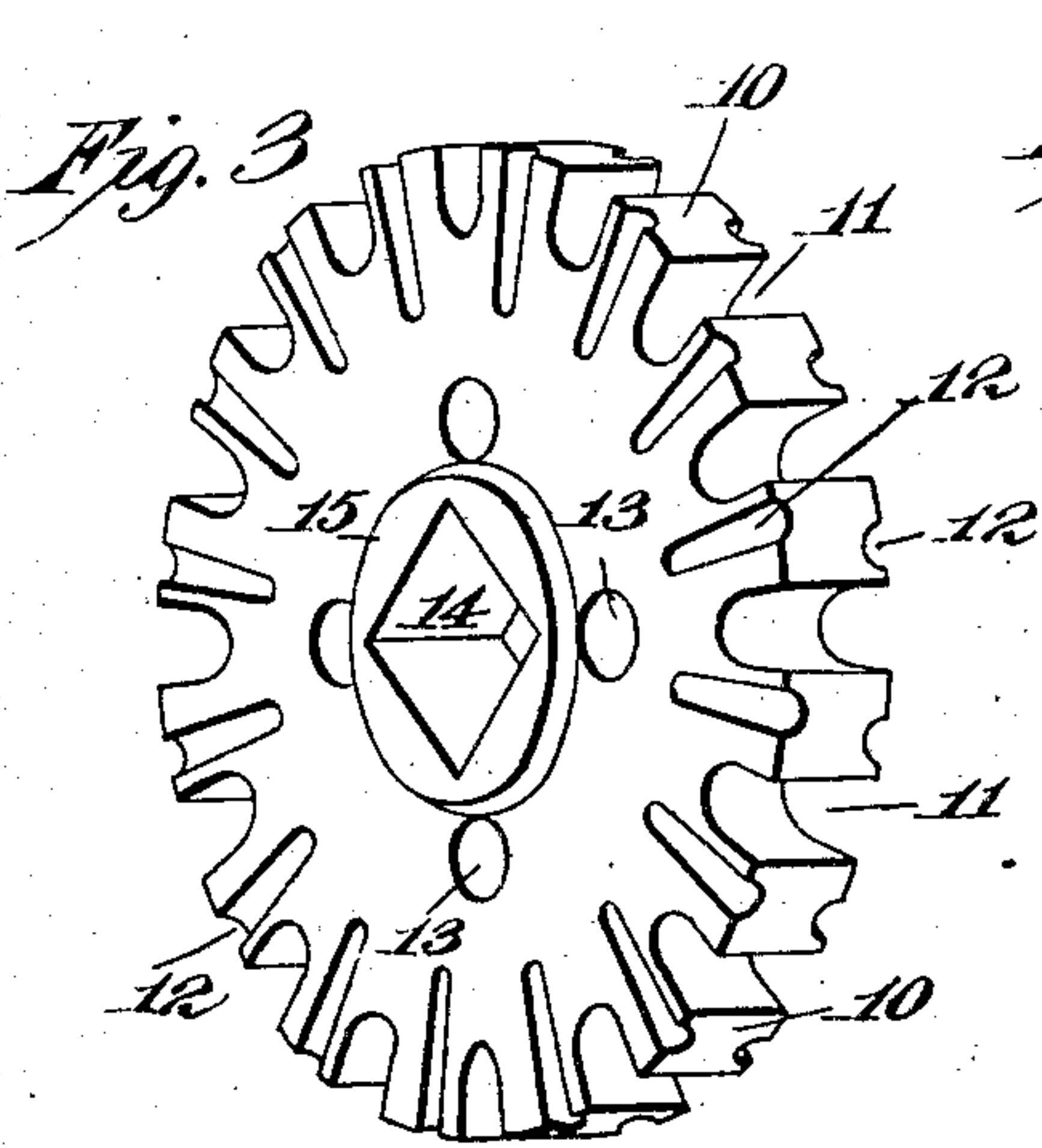
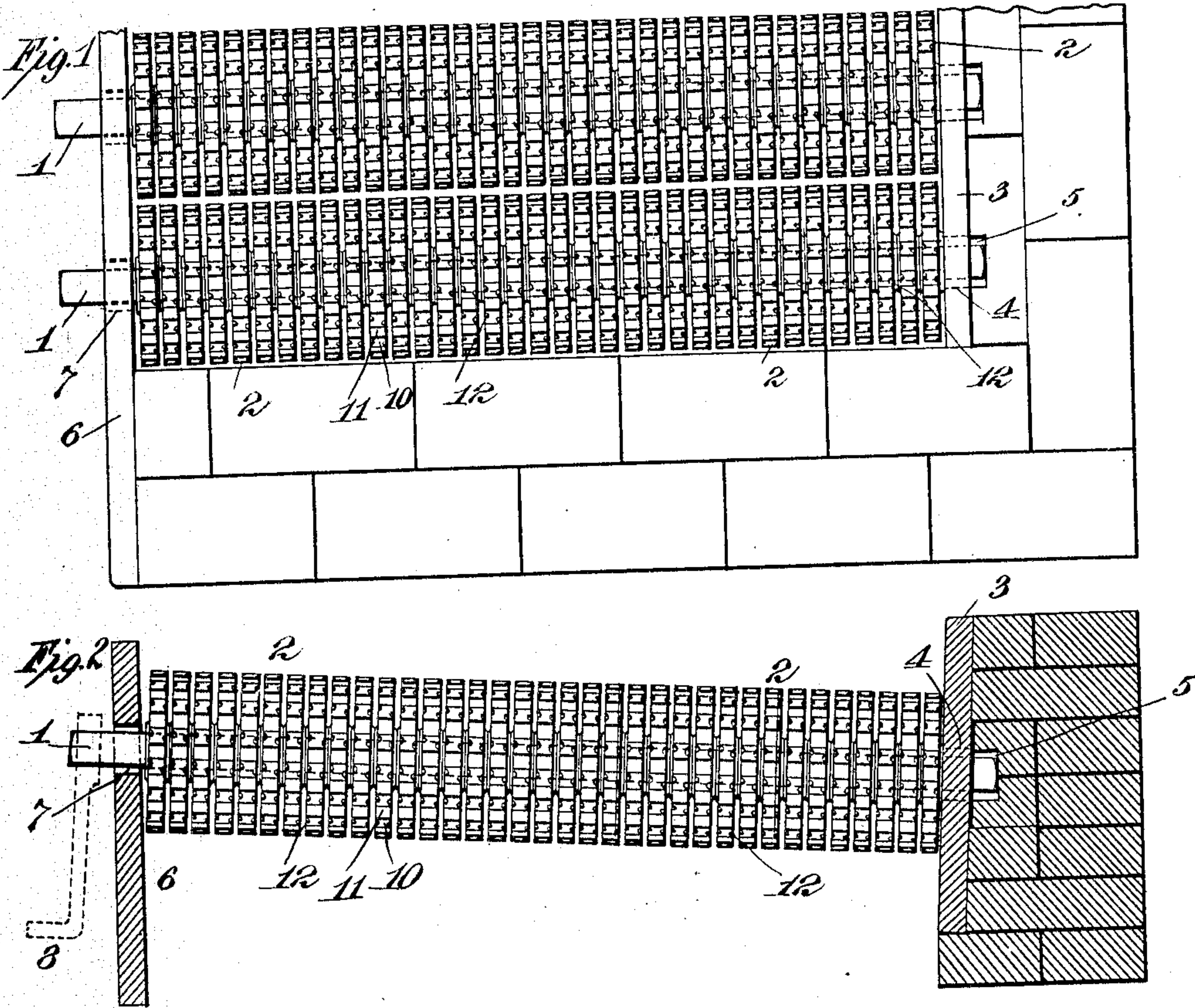


No. 860,210.

PATENTED JULY 16, 1907.

P. B. HARTFORD.
GRATE.

APPLICATION FILED DEC. 6, 1905.



Witnesses:

Geo. F. Clemens
John F. Folsch

Inventor

Peter B. Hartford
By [Signature]

Attorneys.

UNITED STATES PATENT OFFICE.

PETER B. HARTFORD, OF NEW YORK, N. Y.

GRATE.

No. 860,210.

Specification of Letters Patent.

Patented July 16, 1907.

Application filed December 6, 1905. Serial No. 290,524.

To all whom it may concern:

Be it known that I, PETER B. HARTFORD, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented a new and useful Improvement in Grates, of which the following is a description.

The object I have in view is the production of a grate which will be extremely efficient, will improve the quality of the fire, will be constructed of few and simple parts, will burn any kind of coal, and will keep a clean fire.

Further objects are the production of a grate which may be adjusted so as to burn different sizes of coal, may be readily cleaned and which may be repaired without the need of skilled labor.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which

Figure 1 is a plan view of a grate embodying my invention. Fig. 2 is a side elevation thereof. Fig. 3 is a perspective view of one of the disks, and Fig. 4 is a detail view in section of a portion of a grate bar showing washers between the disks so that they will be separated a greater distance to burn large sized coal. In all of the views like parts are designated by the same reference characters.

In carrying out my invention I provide a number of bars 1—1—1 upon which are mounted or strung a number of disks 2—2—2. The bars 1—1 are preferably made of iron, and of a rectangular cross section as shown, although the cross-section may be different, and is not to be limited to the square cross-section shown. At the back of the fire box is a support for the inner end of the bars. The support preferably is shown in the form of a metal plate 3 having a series of round holes 4 therein. This plate 3 is supported within the back wall. At the back of the fire box are openings 5 behind the row of holes 4 so that the inner ends of the bars 1 passing through the holes in the plate will rest within these openings and a somewhat longer bearing secured. In the front of the fire box is arranged another plate 6, which may be a portion of the front of the fire box. As shown in the drawings this plate 6 is a portion of the front of the fire box, although it may be separate. It is provided with a horizontal row of round openings 7 which correspond in number and location with the openings 4 in the plate 3. These openings 7 are preferably a short distance, say two inches, above the level of the openings 4 in the back of the fire box. For this reason the bars 1 will incline slightly toward the back. This will insure the retention of the inner ends of the bars within the openings 4 and 5. The front ends of the bars extend outward a sufficient distance for the application of a crank, such as 8, or other suitable tool for rotating or oscillating the bars. Instead of a crank a ratchet crank may be used.

The disks 2 are preferably each made of cast iron. They are preferably all alike. Each disk has its periphery made up of broad teeth 10 provided with curved ends so that the spaces between these ends of the disks on adjoining bars will control the spaces between the different rows of disks. Between the teeth 10 are spaces 11 which complete the formation of the teeth and enable the grate bars by their rotation to break up clinkers, etc. The broad flat surface formed by the teeth 10 enables the fire to be raked. Preferably the open spaces 11 are of less width than the teeth 10, so that at least half of the periphery of each disk will be uncut. On each side of the teeth 10 are radial grooves 12 which extend towards the center of the disk, but these grooves are not essential and may be omitted. The grooves on each side of the disk are preferably staggered as shown in Fig. 1, although this is not necessary. Holes 13 outside of the hub of each disk serve to lighten them and also provide for the expansion and contraction of the metal. Through the center of each disk is a square hole 14, which is preferably of such a size as to freely slide upon the bar 1, but not large enough to turn thereon. In the center of each disk is a hub with a projecting flange 15 on each side. Preferably each flange is equal in depth to half of the minimum space desired between adjoining disks on the same bar.

The disks are strung on the bars as shown in Fig. 1, so that disks on adjoining bars may be immediately opposite one another, with a separating space determined by the location of the bars.

In use the fire can be raked by rotating one or more of the grate bars. A crank may be applied to one of the bars and either rotated or oscillated as desired. By applying two cranks to adjoining bars they may be rotated in opposite directions, and owing to the rotation of the disks clinkers, etc., may be broken up. The hubs formed upon the disks are preferably arranged to give a space between each disk on the same bar to permit the burning of the finest coal. In order to make the grate suitable for coarser coal washers 16 may be added between the separate disks. The width or number of these washers can accurately adjust the separating interval between disks upon the same bar. In the event of breakage of a disk it may be readily replaced by withdrawing the bar on which it is strung and a new disk at slight expense substituted. The bars 1 are preferably supported at the extremities only, and this is advantageous, as it does not break or interrupt the surface of the grate. In very deep furnaces, however, the bars may be supported intermediate their extremities by means of a suitable support.

The number of teeth 10 is preferably considerable, sixteen being shown on each disk. Also the width of each notch 11 is preferably no greater, or as great, as

the width of each tooth. This is to make each tooth sufficiently thick to be strong enough not to become readily broken. The comparatively great number of teeth is desirable so as to prevent coal from passing 5 through the rows of disks should the teeth be not exactly opposed. The radial grooves 12 may be omitted if desired, as may also be the holes 13.

The grate may be used in any situation for which grates are employed, and is particularly applicable for 10 use with automatic stokers.

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

1. A grate having a plurality of bars, with a plurality of disks on each bar, the said disks being circular, with 15 teeth, the spaces between the teeth being narrower than the teeth, and the faces of the teeth being curved, disks on the adjacent bars being immediately opposite to each other, the separating interval between adjacent disks on adjacent bars being narrower than the spaces between the 20 teeth on the same disk.

2. A grate having a plurality of bars, with a plurality of disks for each bar, the said disks being circular, with teeth, the spaces between the teeth being narrower than

the teeth, and the faces of the teeth being curved, the disks on the adjacent bars being immediately opposite to each 25 other, the separating interval between adjacent disks on adjacent bars being narrower than the spaces between the teeth on the same disk, and spacing washers between the disks for determining the separating interval between con- 30 tiguous disks on the same bar.

3. A grate having a plurality of bars with a plurality of disks on each bar, the said disks being circular, with teeth, the spaces between the teeth being narrower than the teeth and the faces of the teeth being curved, with a radial 35 groove on each side of the teeth extending toward the center of the disk.

4. A grate having a plurality of bars with a plurality of disks on each bar, the said disks being circular, with teeth, the spaces between the teeth being narrower than the teeth and the faces of the teeth being curved, with a radial 40 groove on each side of the teeth extending toward the center of the disk, the grooves on opposite sides of the disk being staggered.

This specification signed and witnessed this fifth day of December, 1905.

PETER B. HARTFORD.

Witnesses:

LEONARD H. DYER,
AUG. LONG.