

No. 655,114.

Patented July 31, 1900.

W. E. & E. F. PRALL.  
PISTON IMPACT ENGINE.

(Application filed Feb. 24, 1899.)

(No Model.)

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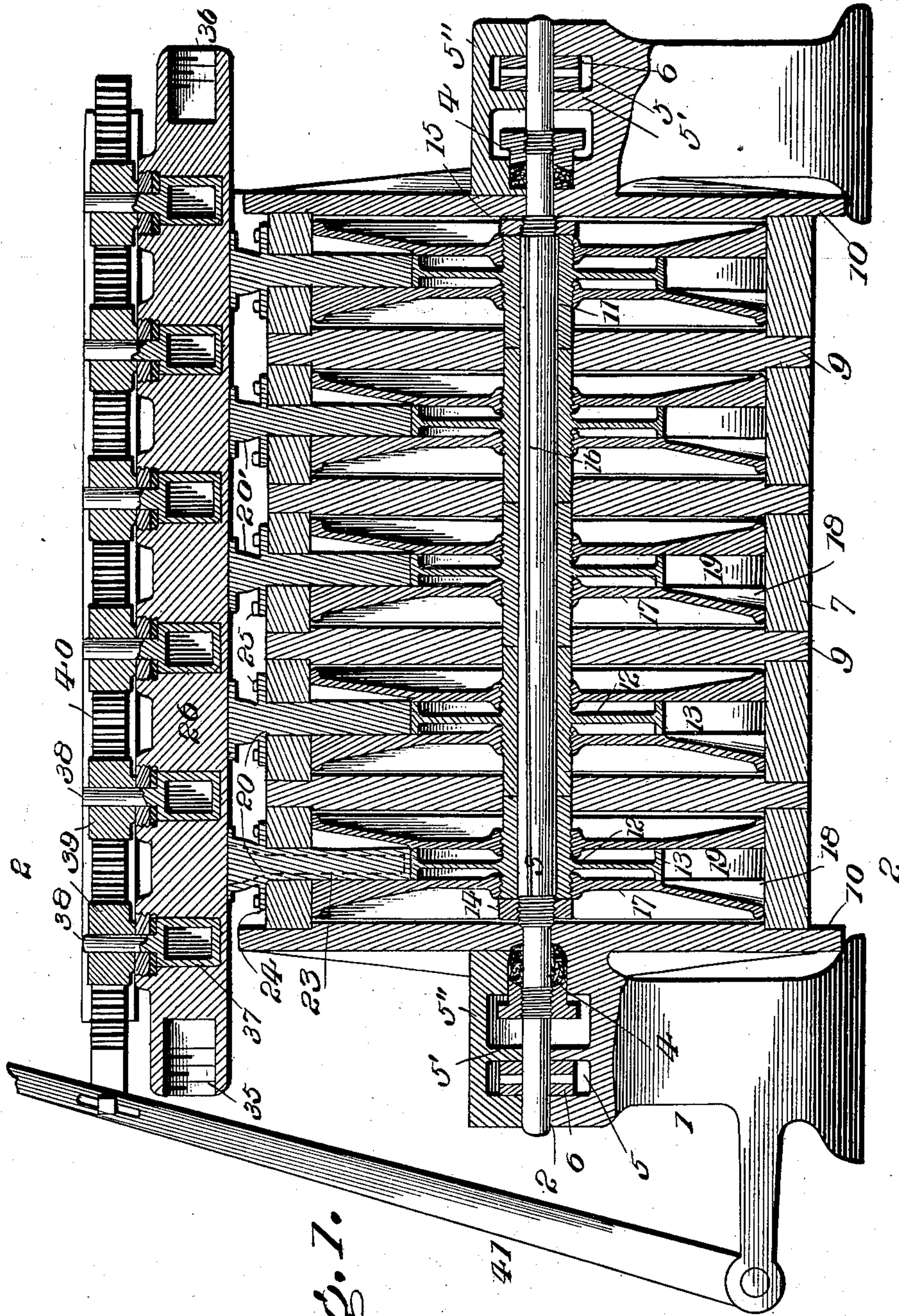


Fig. 1.

Witnesses

*J. W. Gould.*  
D. W. Gould.

Inventors

W. E. Prall,  
E. F. Prall,  
by *Reuf. R. Catlin*

Attorney



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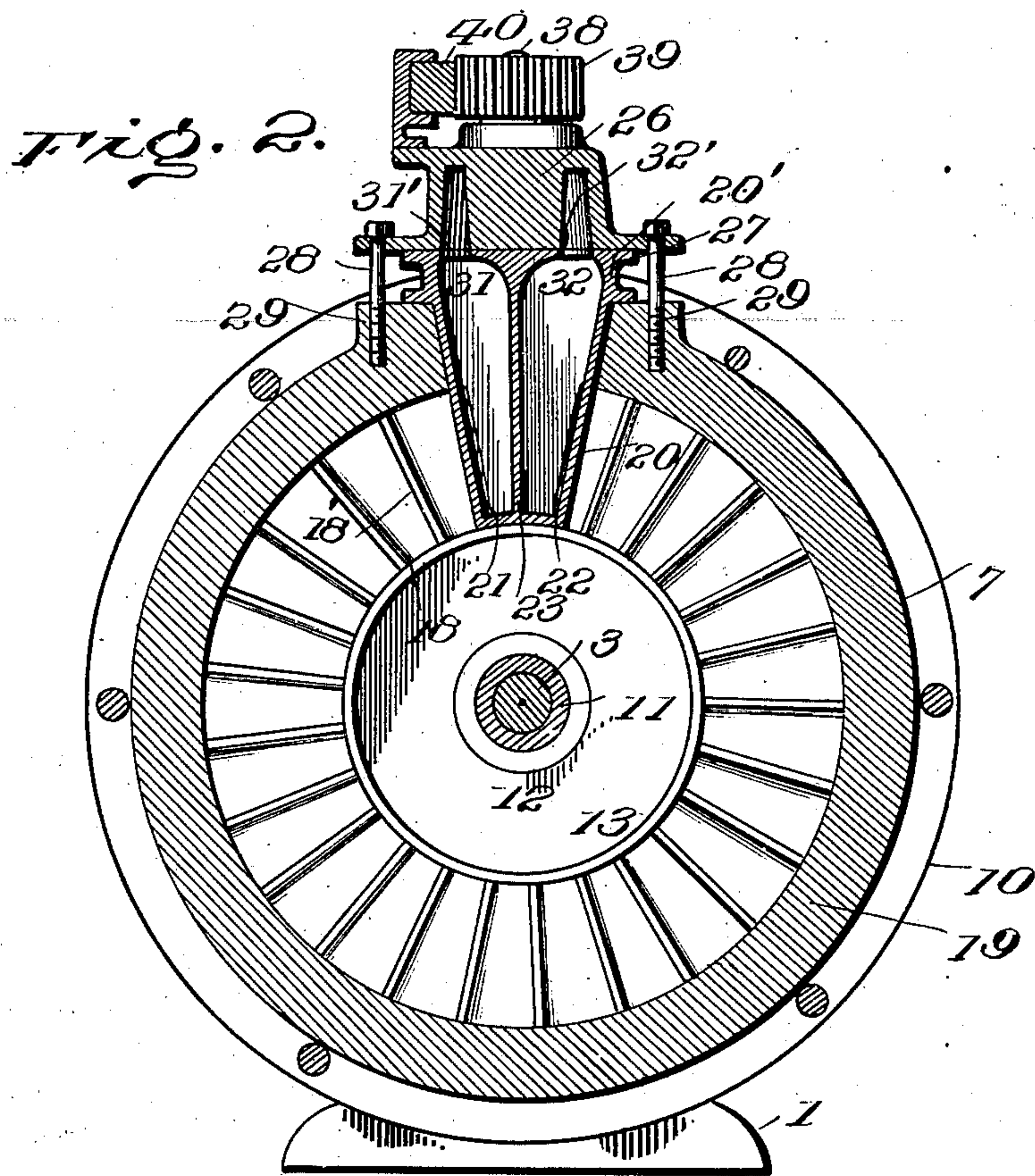
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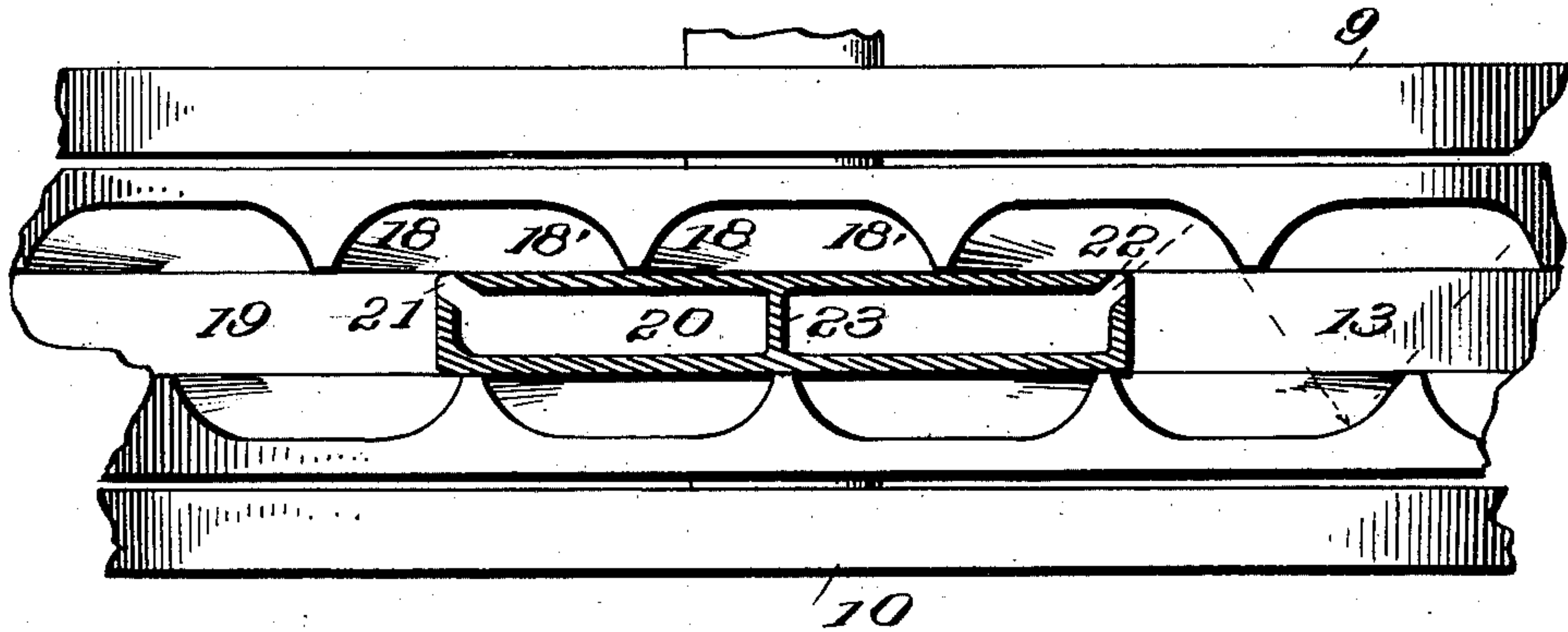
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*Fig. 3.*



Witnesses

*J. W. Gould.*

Inventors

*W. E. Prall,*  
*E. F. Prall,*  
by *Rev. R. Catlin*

Attorney



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Fig. 7.

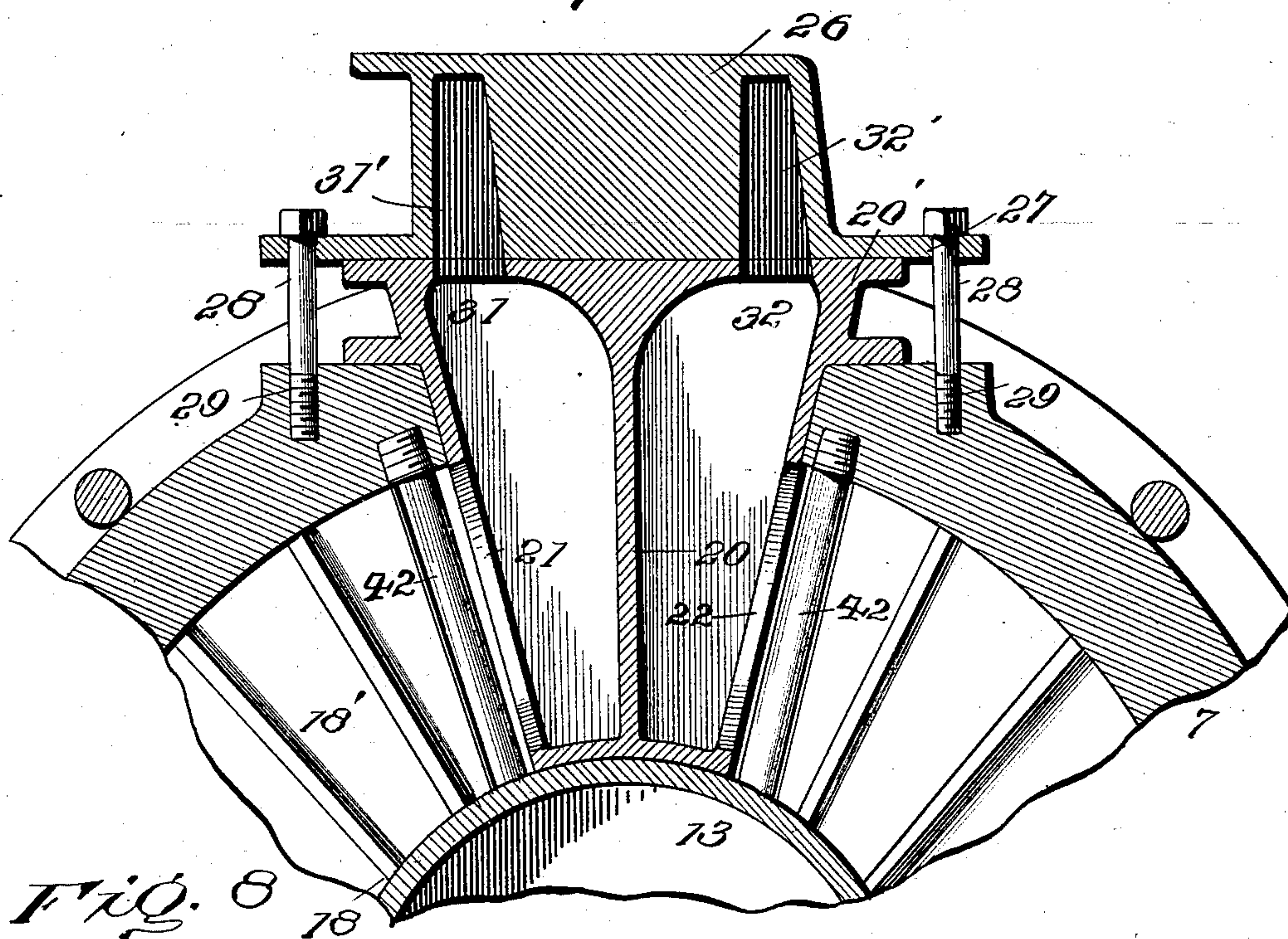


Fig. 8

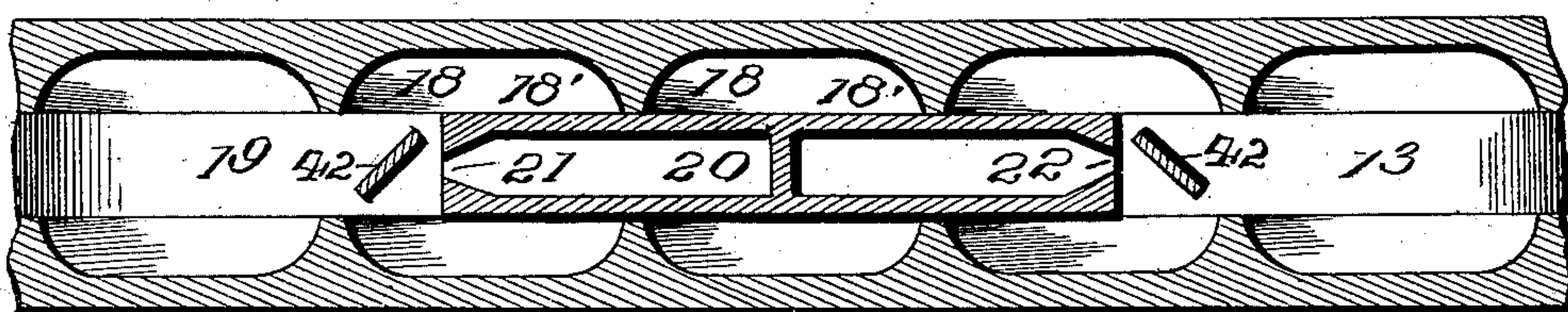


Fig. 9

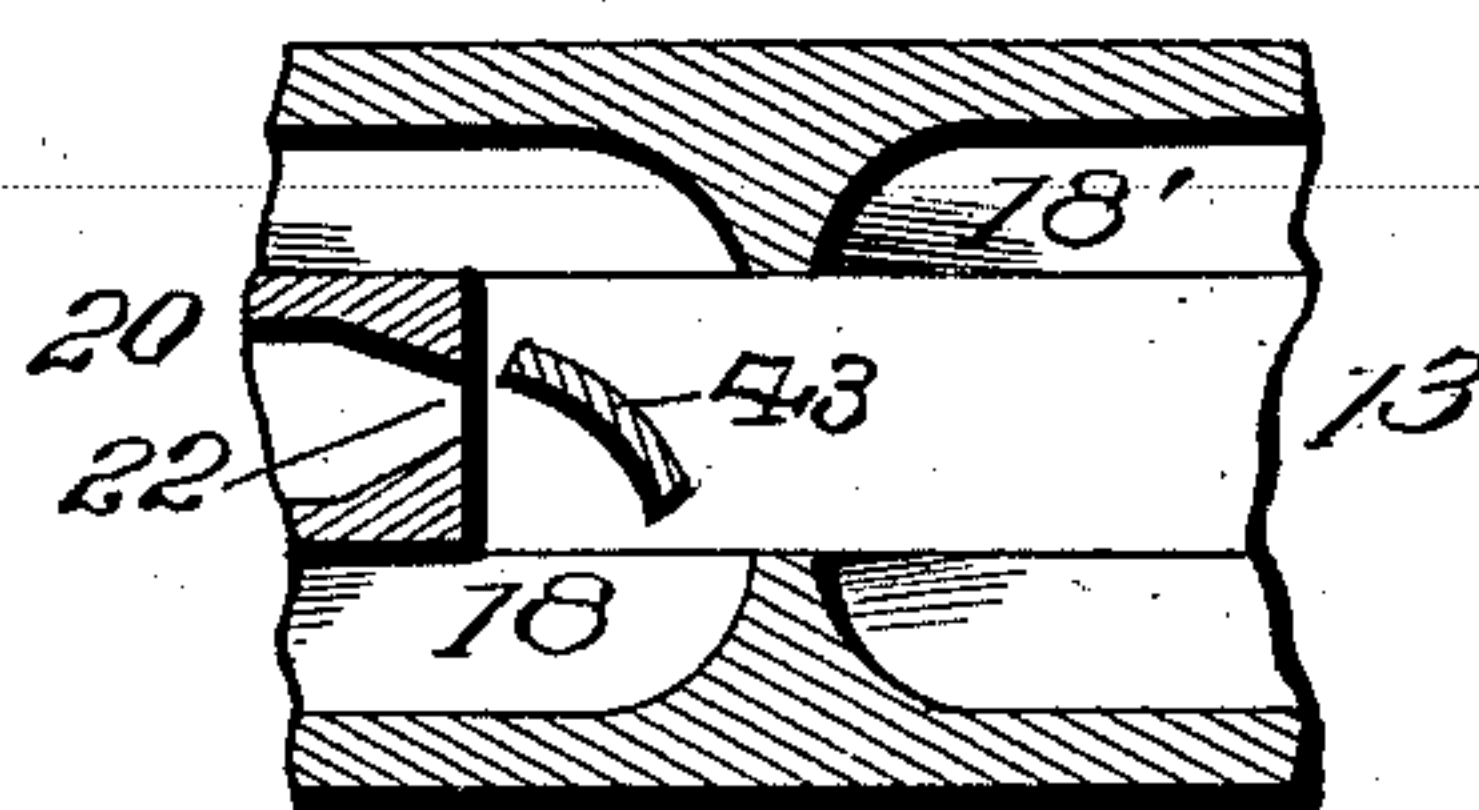
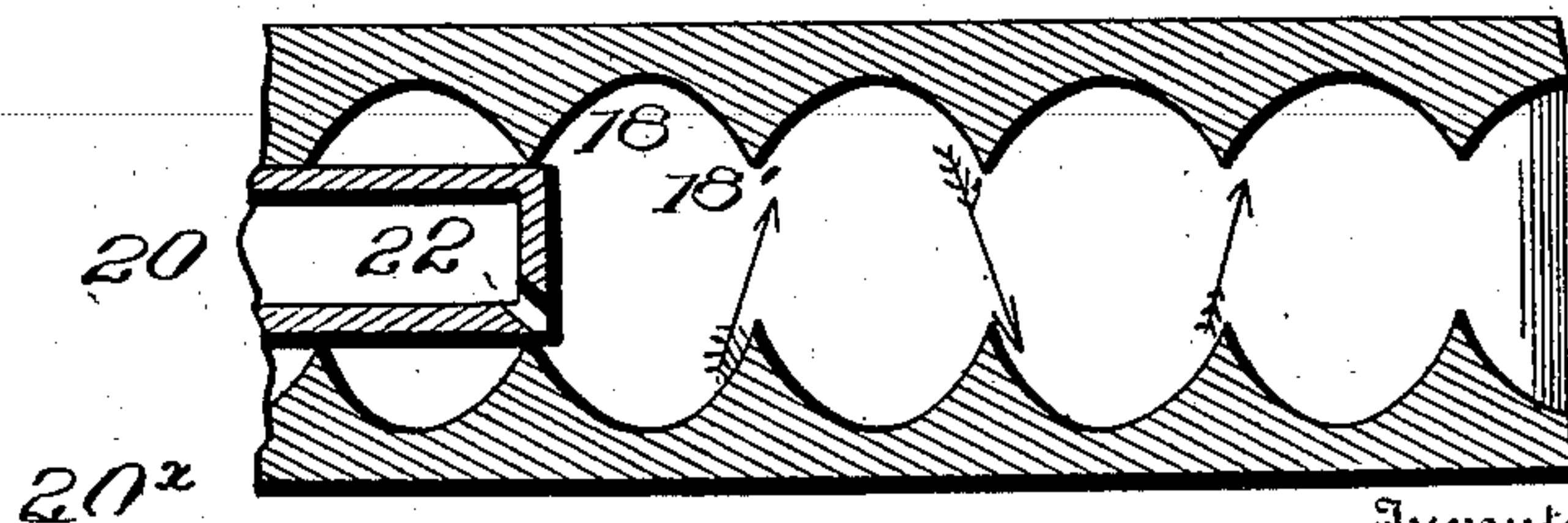


Fig. 10



Witnesses

*For Invention*  
*D. W. Gould*

Inventors

*W. E. Prall,*  
*E. F. Prall, by*  
*Ray. R. Carlin*  
Attorney



# UNITED STATES PATENT OFFICE.

WILLIAM EDGAR PRALL AND EDGAR FREDERICK PRALL, OF  
NEW YORK, N. Y.

## PISTON-IMPACT ENGINE.

SPECIFICATION forming part of Letters Patent No. 655,114, dated July 31, 1900.

Application filed February 24, 1899. Serial No. 706,791. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM EDGAR PRALL and EDGAR FREDERICK PRALL, citizens of the United States, and residents of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Piston-Impact Engines, of which the following is a specification.

10 The invention relates to rotary engines of the turbine type, and has for its object to provide improvements in motor-wheels and to provide simple and efficient devices, including cocks or valves, for operatively connecting the motor-wheels in series and for reversing the engine.

The invention consists in the construction herein described and pointed out.

20 In the accompanying drawings, Figure 1 is a longitudinal section of the improved engine. Fig. 2 is a section on line 2 2 of Fig. 1. Fig. 3 is a partial edge view of a motor-wheel, an abutment being shown in section. Fig. 4 is an enlarged section of a valve-casing and valve. Fig. 5 is a perspective of an abutment and an abutment extension. Fig. 6 is an enlarged broken perspective of a wheel-disk. Fig. 7 is a partial section showing deflecting-plates. Fig. 8 is a partial section in a transverse plane. Fig. 9 is a partial section showing a modified deflector. Fig. 10 is a like section showing modified impact-faces.

30 Numeral 1 denotes standards having bearings 2 for a shaft 3. Outside of the stuffing-boxes 4 are oil-receptacles 5, closely filled lengthwise the shaft by rings 6. These oil-receptacles are thus situated at a distance from the engine-cylinder to avoid excessive heating of the oil. The oil and stuffing-box chambers are separated from each other by a partition 5'. A detachable cap is denoted by 5".

45 The engine cylinder or casing comprises a series of rings 7, separated by partitions 9 and clamped together with them by rods binding together the cylinder-heads 10.

50 Upon the shaft, within the casing, are a series of hubs 11, having fixed thereto integrally or otherwise annular webs or intermediate disks 12, provided with circumferential flanges or rings 13. These hubs are held by

sleeves 14 and 15, having one a right and the other a left hand interior screw-thread adapted to engage the shaft, suitably threaded to cooperate in joining the hubs together and fixing them on the shaft. A spline or splines are denoted by 16. The hubs are exteriorly threaded on each side of the disks 12 to receive the interiorly-threaded sleeves of bucket-disks 17. Bucket-disk faces to receive impact of steam are denoted by 18 and 18'. These faces are preferably oppositely inclined and toward the plane of rotation to receive the most efficient action of the steam in driving the engine in either direction. Steam is admitted under conditions that insure a zig-zag course from side to side, thereby preventing its direct escape through the intermediate open steamway. By this construction and by combining several motor-wheels high steam-pressure can be thoroughly utilized and steam exhausted at low pressure, notwithstanding a continuous circulation, the admission and exhaust ports being left open as long as desired. The bucket-disks are arranged in pairs, and the screw-threaded hubs of each pair are screwed toward each other upon a hub 11 until they bear oppositely upon the ring or flange 13. Exterior to their junction with said flange the proximate faces of the disks are provided with buckets arranged in annular series with the before-mentioned faces 18 and 18', situated oppositely in the plane of rotation. The disks and their respective buckets are separated by a circumferential steamway 19. Such way, which may have any suitable transverse dimension, is made sufficiently large to receive an abutment 20, provided with steam-ports 21 and 22, separated by a partition 23. The abutment is fitted tightly to the casing by means of flanges 24 and bolts 25 or in any suitable manner. It has an exterior extension 20', which is tightly connected to a valve casing or housing 26 by means of flanges 27 and bolts 28, that engage the engine-casing at 29. The abutment is divided by a partition 23, which extends through the abutment extension to the valve-housing 26, thereby separating the two extension-ports 31 and 32, which may communicate in one direction with the steamway through abutment-ports 21 and 22, respectively, and in the other with a valve-



port by means of housing-ports 31' and 32'. The valves or cocks each have a port 30.

The valve-bodies are denoted by 37. Each has a stem 38, provided with a pinion 39 fixed thereon, all being operatively connected with a rack 40, which is moved by a lever 41 or by any suitable means to simultaneously rotate the cocks to reverse the engine. The valve-casing admits steam at 35 and exhausts finally at 36.

In operation if steam is admitted through the first valve, for example, it passes through ports 31', 31, and 21 into the steamway and is exhausted through ports 22, 32, and 32'. The steam next passes through the second cock to a second port 31', and after making a circuit such as described passes through the succeeding valves one for each motor-wheel in the series. If the valves be reversed, steam is admitted to ports 32' 32 22 and to the steamway and is exhausted through ports 21, 31, and 31', from which latter port it then passes through the adjacent valve, suitably turned by the reversing, to a second series of ports 32', 32, 22, 21, 31, and 31'.

In the improved construction each motor-wheel is combined with a ring constituting a unit of the casing, and said ring supports the wheel-abutment. The construction is such that a single ring with its wheel and abutment can be employed in an engine, or additional rings and wheels can be used in any desired number, and the engine can be made reversible, if desired, in any case.

Except in the case of a single wheel each wheel is situated in a distinct compartment bounded by a ring and partitions 9, except at the ends of a multiple-wheel engine, in which the cylinder-heads bound the two-wheel compartment on the exterior. In case of a single wheel the compartment is bounded by a ring and heads 10.

The valves can be used, if desired, to vary the admission of steam, but when once properly opened can remain at rest except it is required to reverse the engine or to vary the steam admission.

Referring to several figures heretofore not particularly described, Figs. 7 and 8 show inlet-ports 21 and 22 directed against deflecting-plates. In Fig. 9 a curved deflecting-plate 43 is illustrated. These examples are given to show that various constructions may be adopted to suitably direct steam against the impact-faces.

In Fig. 10 is shown a modified form of impact-faces, the invention not being limited to the precise form and relative dimensions illustrated.

Having thus described our invention, we claim—

1. In an engine, an engine-casing, a shaft, a wheel situated in the casing having two disks comprising a steamway, an intermediate disk fixed on the shaft, means for securing the disks on the shaft, such means being adapted to hold the wheel-disks against the interme-

diate disk, and a fixed abutment situated in the steamway.

2. In an engine, an engine-casing, a shaft, a hub surrounding the shaft and fixed against rotation, said hub having a disk fixed thereto, wheel-disks fixed to the hub and held against the first-named disk, a steamway outside the periphery of the intermediate disk, and an abutment situated in said steamway.

3. In an engine, a shaft, a cylinder-casing, a wheel having impact-faces and a steamway adjacent said faces, an abutment fixed in the steamway having separate ports adapted to communicate alternately with the steamway, and a valve having a single port adapted to be put in direct communication with either abutment-port.

4. In an engine, a shaft, a cylinder-casing, a wheel having impact-faces and a steamway adjacent said faces, an abutment fixed in the steamway having separate ports adapted to communicate alternately with the steamway, and a valve having a single port adapted to be put in direct communication with either abutment-port, and adapted in either case to be mediately put in communication with the port of a separate valve, and said separate valve.

5. In an engine, a shaft, a cylinder-casing, a plurality of wheels each having impact-faces and an abutment fixed in a steamway between said faces, the abutment being provided with separate ports adapted to communicate alternately with the steamway, and a plurality of valves each having a port to be put directly in communication with either port of a corresponding abutment and mediately with the admission-port of a similar adjacent valve.

6. In an engine, a shaft, a cylinder-casing, a plurality of wheels each having impact-faces and bucket-disks, hubs to connect the disks to the shaft, means to clamp the hubs on the shaft, and an abutment fixed in a steamway between said faces of each wheel, each abutment being provided with separate ports adapted to communicate alternately with the steamway, and a plurality of valves each having a port to be put directly in communication with either port of a corresponding abutment and mediately with the admission-port of a similar adjacent valve.

7. In an engine, a shaft, a cylinder-casing, a plurality of wheels each having impact-faces and bucket-disks, hubs to connect the disks to the shaft, means to clasp the hubs on the shaft, and an abutment fixed in a steamway between said faces of each wheel, each abutment being provided with separate ports adapted to communicate alternately with the steamway, and a plurality of valves each having a port to be put directly in communication with either port of a corresponding abutment and mediately with the admission-port of a similar adjacent valve, and devices for simultaneously opening the valves to admit steam to the several wheels in succession.



8. In an engine, a shaft, a cylinder-casing, a plurality of wheels each having impact-faces and bucket-disks, hubs to connect the disks to the shaft, means to clamp the hubs on the shaft, and an abutment fixed in a steamway between said faces of each wheel, each abutment being provided with separate ports adapted to communicate alternately with the steamway, and a plurality of valves each having a port to be put directly in communication with either port of a corresponding abutment and mediate with the admission-port of a similarly adjacent valve, and devices for simultaneously opening the valves to admit steam to the several wheels in succession, said valves being each reversible and adapted to admit steam in a reverse order to the various ports communicating with its corresponding wheel.
9. In an engine, a cylinder-casing, a plurality of wheels having impact-faces and a steamway adjacent said faces, abutments fixed one in each steamway, each abutment having separate ports alternately communicating with a steamway, and a plurality of valves each having a port adapted to be put directly in communication with either of its corresponding abutment-ports and mediate with the port of another valve.
10. In an engine, a shaft, a cylinder-casing comprising a series of rings clamped between the cylinder-heads, a rotary motor-wheel fixed to the shaft within each ring, an

abutment for each ring extending into a steamway in the wheel and communicating with a single steam-supply valve, and a supply-valve for each ring, all substantially as described, whereby steam may be passed through the several abutments in succession, and whereby the engine may be made of greater or less length by varying the number of rings and connections.

11. In an engine, the combination of a cylinder comprising separable sections each having an admission and exhaust port, valves, one for each cylinder-section situated outside the cylinder, and devices to operate the valves to pass steam through them and their corresponding cylinder-sections in succession.

12. In an engine, the combination of a cylinder comprising separable sections each having an admission and exhaust port, valves, one for each cylinder-section situated outside the cylinder, closed disks between the sections, and devices to operate the valves to pass steam through them and their corresponding cylinder-sections in succession.

Signed at New York city, in the county of New York and State of New York, on this 16th day of February, A. D. 1899.

WILLIAM EDGAR PRALL.  
EDGAR FREDERICK PRALL.

Witnesses:

JULIA L. PRALL,  
J. BERNARD ENGLISH.