No. 804,135. PATENTED NOV. 7, 1905.

G. A. KELLY.

ROTARY ENGINE.

APPLICATION FILED JULY 31, 1905.

4 SHEETS—SHEET 1.

Fig. 1.

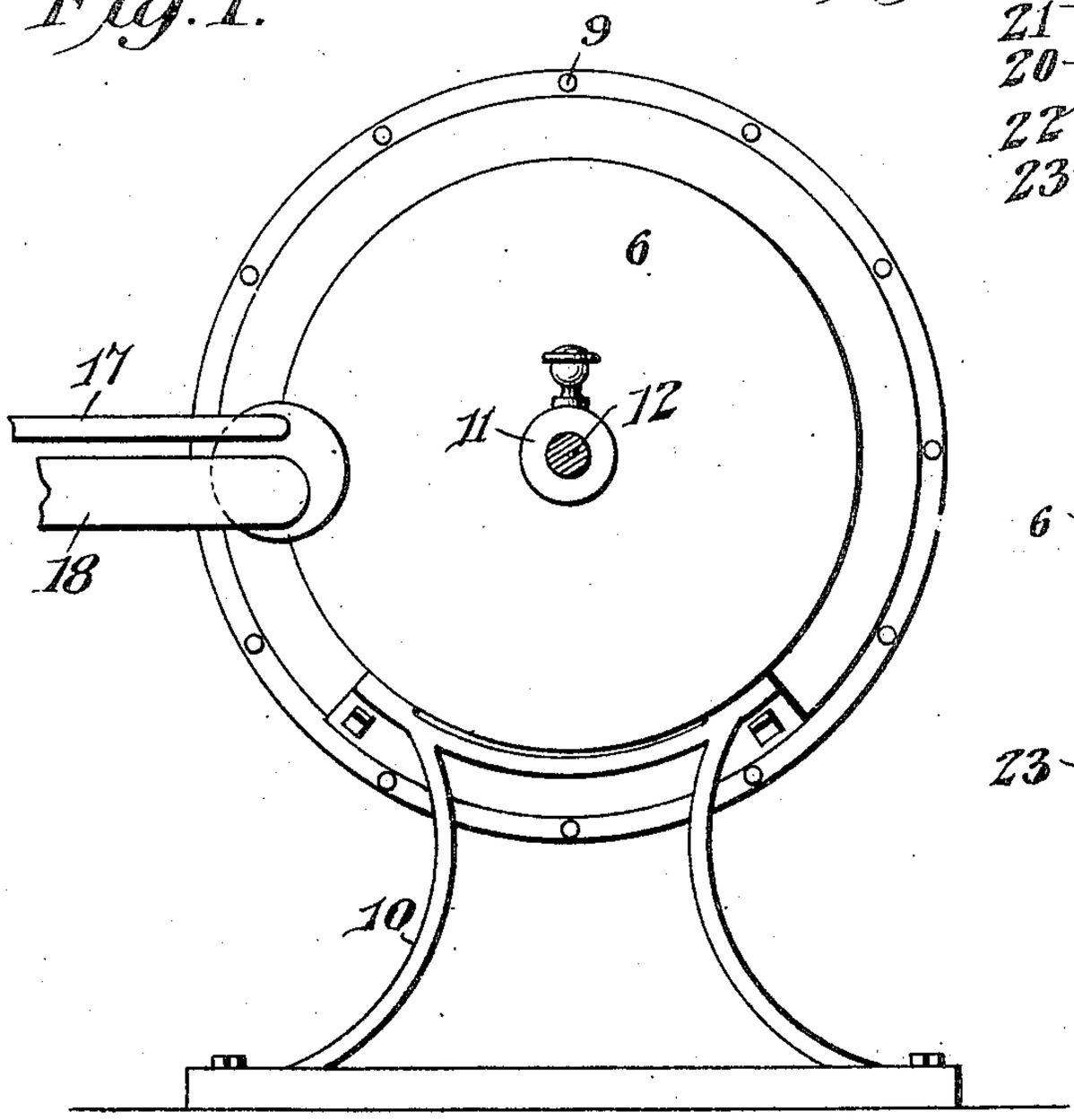


Fig. 5.

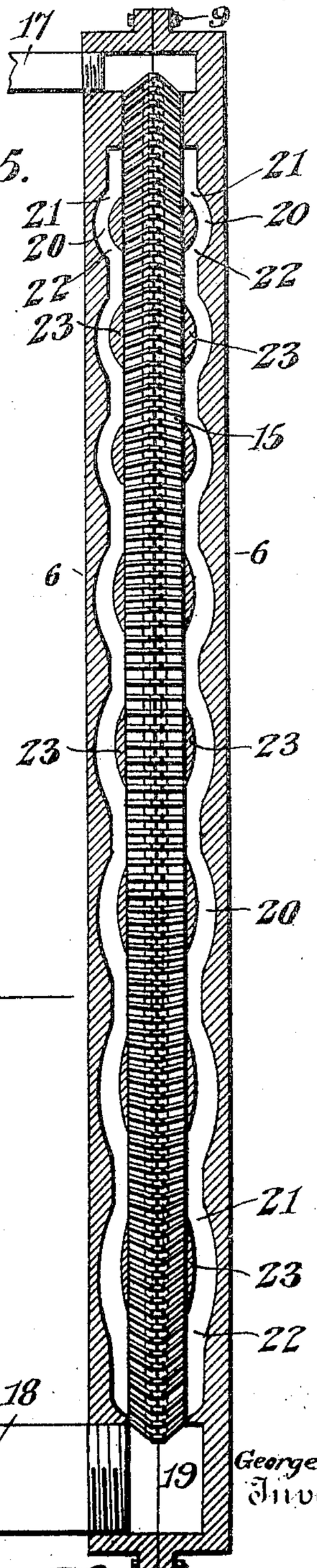
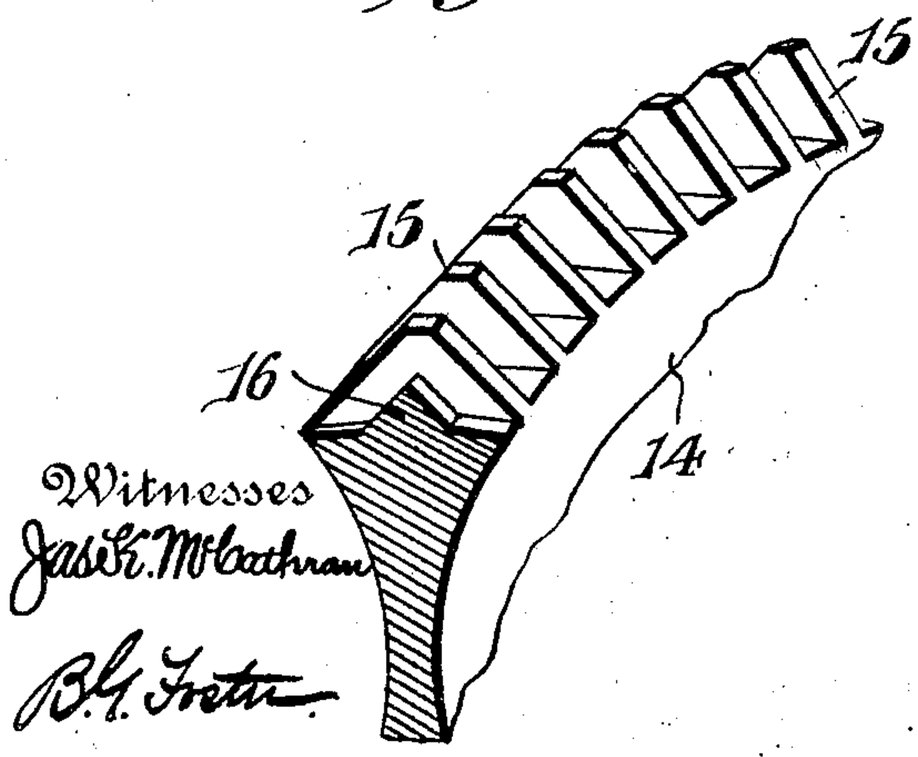


Fig. 4.



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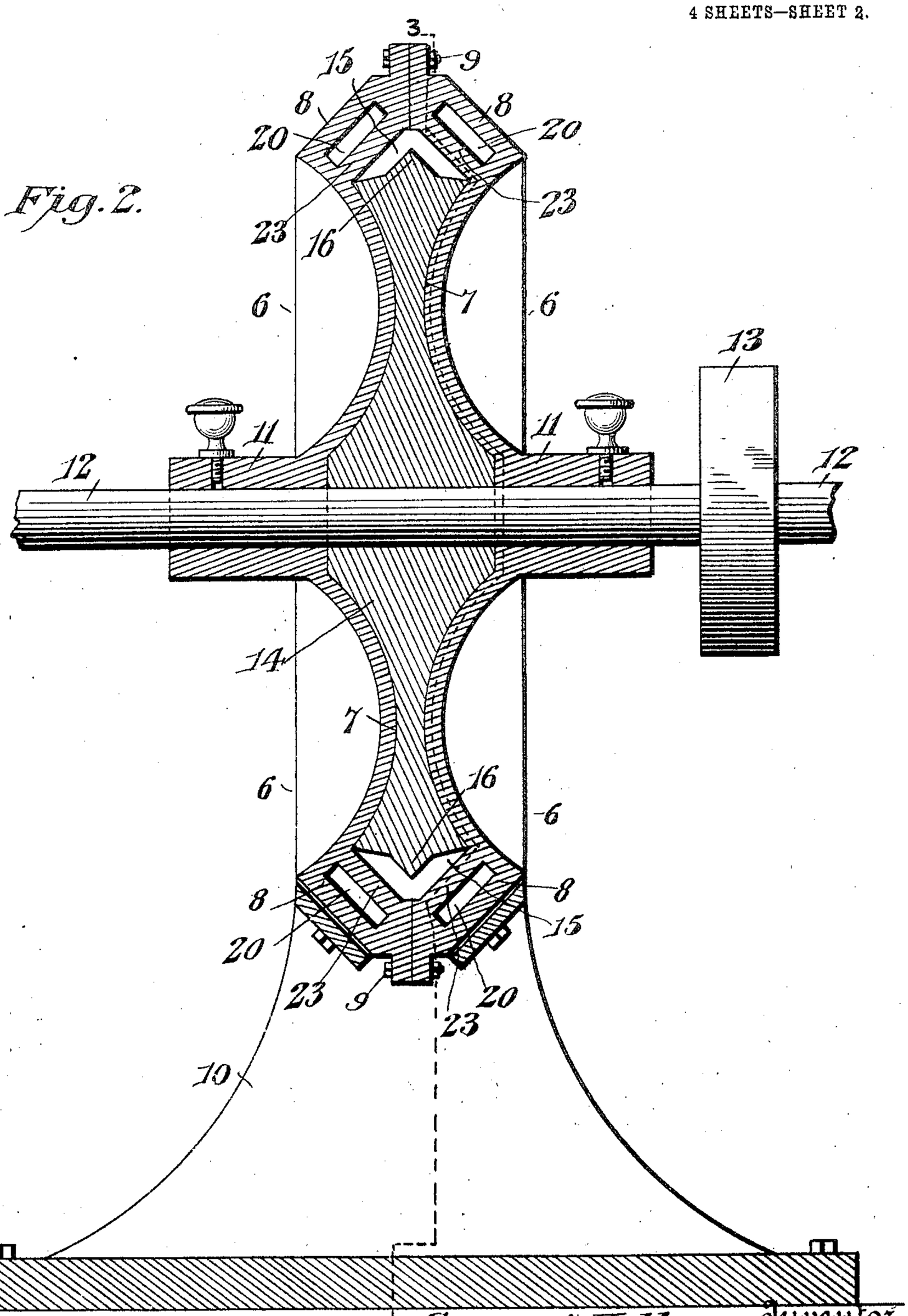
4 SHEETS—SHEET 2.

Fig. 2.



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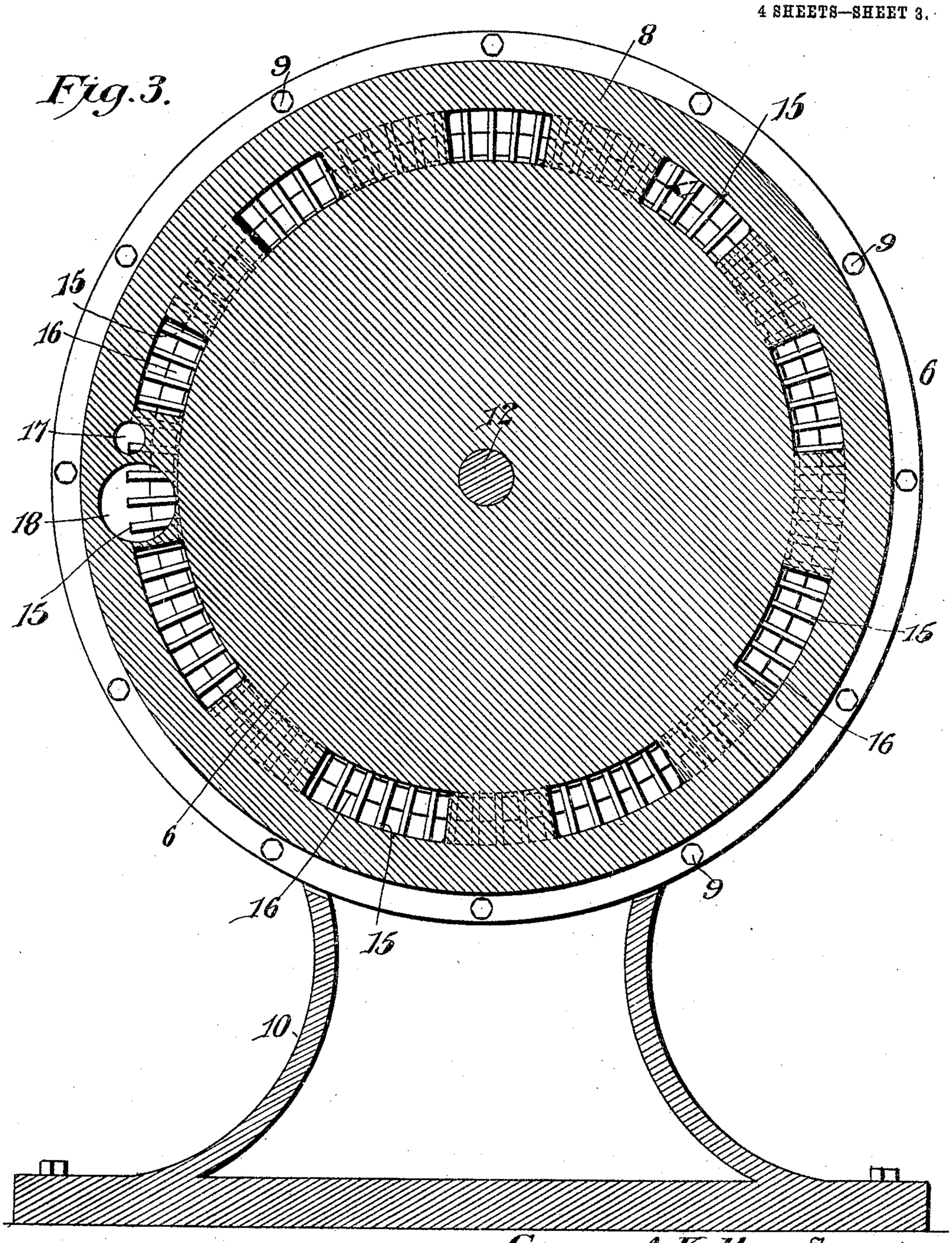
4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 6.

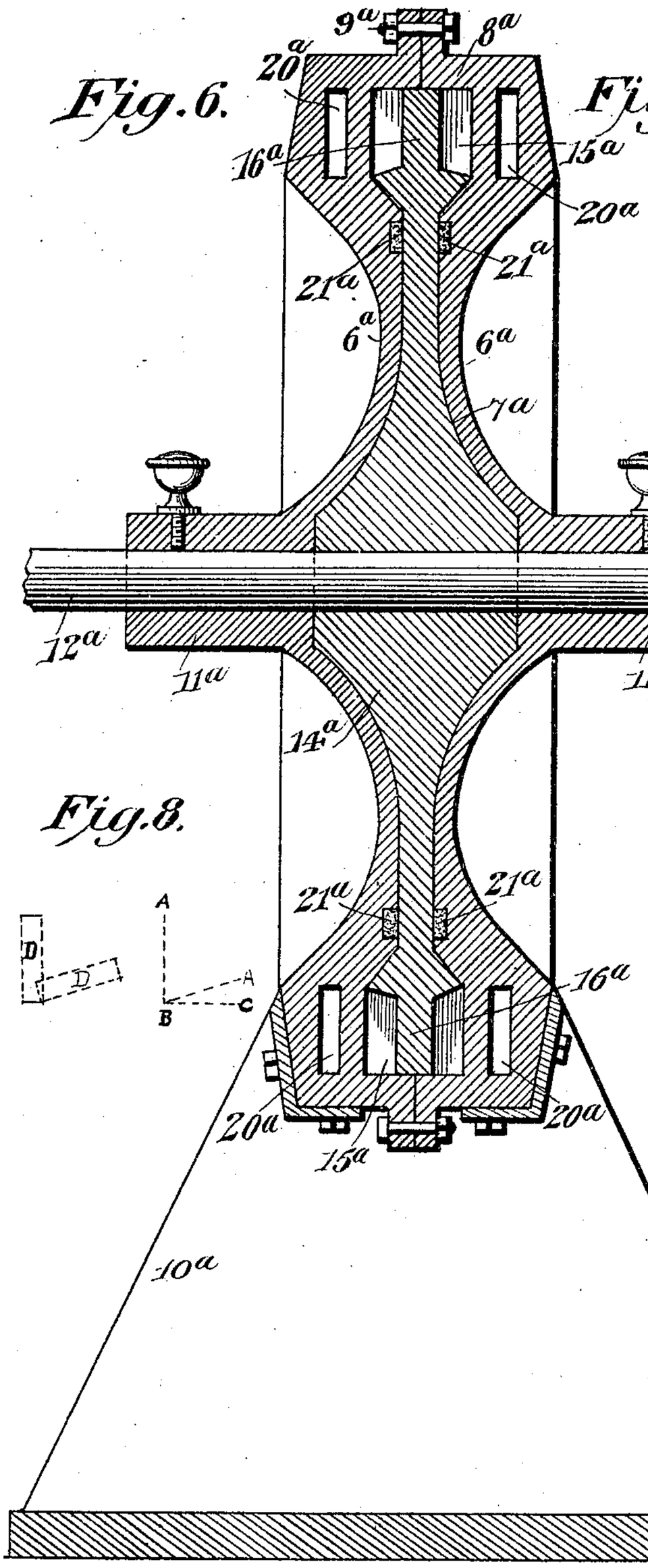

Fig. 7.

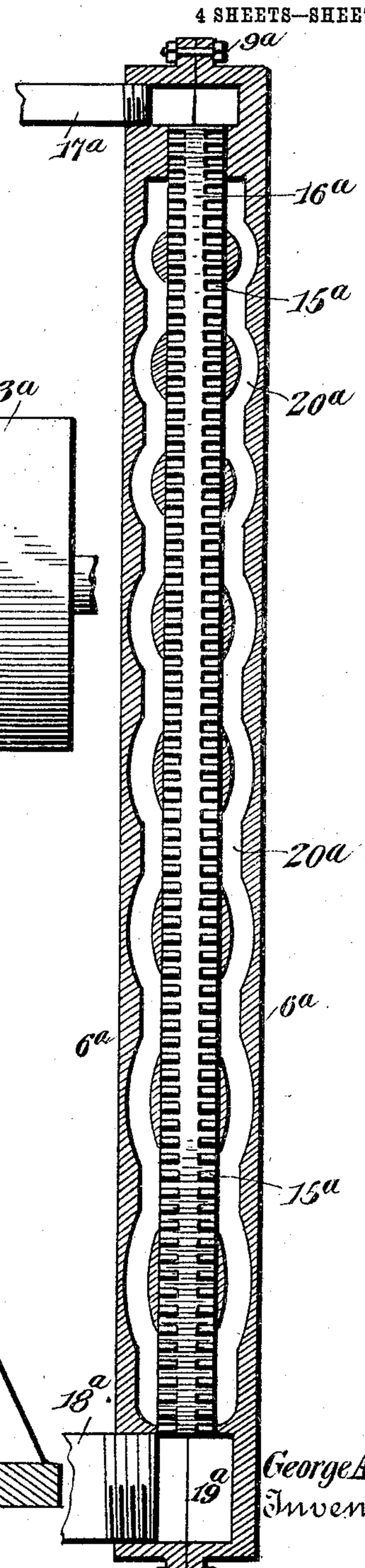

Fig. 8.

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UNITED STATES PATENT OFFICE.

GEORGE A. KELLY, OF LONGVIEW, TEXAS.

ROTARY ENGINE.

No. 804,135. Specification of Letters Patent. Patented Nov. 7, 1905.

Application filed July 31, 1905. Serial No. 272,077.

To all whom it may concern:

Be it known that I, GEORGE A. KELLY, a citizen of the United States, residing at Longview, in the county of Gregg and State of Texas, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention relates more particularly to rotary engines of the impact type driven by steam or other expansible motive fluid.

One of the principal objects is to provide a simple structure of a novel nature in which the same motive fluid is effectively delivered against the rotary piston a number of times, thus utilizing practically the full force of such fluid, the arrangement being such that end thrust upon the piston is avoided, with a consequent reduction of friction and wear.

A further object is to provide an engine of the above character that is made up of a few simple parts which can be manufactured without difficulty and at comparatively slight expense.

Two embodiments of the invention are illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of one form of the engine. Fig. 2 is a vertical cross-sectional view through the same on an enlarged scale. Fig. 3 is a sectional view taken substantially on the line 3 3 of Fig. 2. Fig. 4 is a detail perspective view of a portion of the piston. Fig. 5 is a development of the peripheral portion of the casing and piston. Fig. 6 is a vertical cross-sectional view through a different embodiment of the invention and one that is at present considered preferable. Fig. 7 is a development of the peripheral portion of the same. Fig. 8 is a diagrammatic view indicating the different inclinations at which the edges of the blades and channels may be located.

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

In the first form illustrated a casing is employed comprising two sections 6, forming between them a piston-chamber 7, said sections having angularly-disposed peripheral wall-sections 8, constituting the outer walls of the piston-chamber and being secured together by suitable bolts 9. The casing may be supported in any suitable manner—as, for instance, upon a base 10. The sections 6 are provided with centrally-disposed outstanding journal-boxes 11, in which is mounted an engine-shaft 12, that extends across the piston-chamber and may be provided with a driving-pulley 13.

Suitably secured to the shaft and located in the chamber 7 is a piston 14, preferably conforming to the shape of said chamber, as clearly shown in Fig. 2. This piston is provided on its periphery with a series of radially-disposed wings or blades 15, which taper toward their outer ends and correspond in shape to the outer portion of the chamber 7, formed by the angularly-disposed wall-sections 8. An annular strengthening-rib 16 bridges the space between the blades 15 and serves as a reinforcement therefor. Steam or other motive fluid is primarily introduced into the casing and against the abutments 15 in any suitable manner—as, for instance, through a supply-pipe 17, communicating with the peripheral portion of the chamber—as shown in Fig. 5. In like manner an exhaust-pipe 18 has its receiving end in communication with an exhaust-chamber 19 in the casing.

The inlet and exhaust are located contiguous to each other, and means are employed for repeatedly directing the motive fluid against the blades of the piston entirely around the casing. This means is as follows: In each of the peripheral wall-sections 8 of the casing is formed a set of motive-fluid channels 20, which are curved, as clearly shown in Fig. 5, each channel being furthermore provided with an inlet-mouth 21 and an outlet-mouth 22, the outlet-mouth of one channel being disposed in advance of and in spaced relation to the inlet-mouth of the succeeding channel, said mouths communicating with the peripheral portions of the piston-chamber 7, so as to deliver the motive fluid successively against the wings or blades of the piston and again receiving therefrom. As shown in Fig. 5, the inlet and outlet mouths of each channel are separated by a web portion 23, and in this figure it will furthermore be seen that the channels are successively enlarged in cross-sectional area between the inlet and the nozzle, this arrangement being preferable in order to permit the expansion of the motive fluid during its course about the casing, so as to secure the expansive force against the piston. The opposing corresponding channels of the different sets are also arranged so that their discharge-mouths direct the jets of motive fluid in opposite directions inwardly and at an acute angle against the

blades. The result is that the motive-fluid pressure is practically balanced against the piston, end thrust being thus avoided, so that friction and wear from this cause are eliminated. This impinging action of the opposite jets is repeated entirely about the casing, and consequently practically the full force of the steam is secured. The structure, moreover, is exceedingly simple, the casing being composed of two sections that can be readily cast with the channels cored. Thus it will be seen that the present embodiment of the invention has all the advantages set forth in the preliminary portion of the specification.

An embodiment of the invention that is at present considered preferable is illustrated in Figs. 6 and 7, wherein a casing is employed comprising two sections 6^a, forming between them a piston-chamber 7^a, said sections having peripheral wall-sections 8^a, constituting the outer walls of the piston-chamber, and being secured together by suitable bolts 9^a. The casing may be supported, as in the previously-described embodiment, upon a base 10^a. The sections 6^a are provided with centrally-disposed outstanding journal-boxes 11^a, in which is mounted an engine-shaft 12^a, that may be provided with a suitable driving-pulley 13^a. Suitably secured to the shaft and located in the chamber 7^a is a piston 14^a, which is provided on its periphery with a series of radially-disposed wings or blades 15^a, connected by an annular intermediate strengthening rib or web 16^a, that bridges the space between the blades, preferably extending to their outer edges and constituting a reinforcement therefor. Steam or other motive fluid is preferably introduced into the casing and against the abutments through a suitable supply-pipe 17^a, an exhaust-pipe 18^a being also provided, which communicates with a suitable exhaust-chamber 19^a in the casing. In this particular embodiment of the invention it will be noted that the outer side edges of the blades 15^a are parallel, and the sets of motive-fluid channels 20^a, located in the peripheral wall-sections 8^a, are disposed perpendicular to the plane of the shaft. The said channels otherwise are preferably of the same formation as those disclosed in the first embodiment of the invention, and a further description thereof is consequently thought to be unnecessary. In this structure packing-rings 21^a are shown, which rings are preferably employed to prevent leakage from the piston-chamber between the piston and casing-walls. The operation of this modification is substantially the same as that already described, and it has the same advantages, the motive fluid being projected inwardly in opposite direction and eliminating all end thrust upon the moving parts.

In regard to the inclination of the opposite edges of the piston-blades and the channels it may be stated that the degree of such inclination may be varied, as desired and as indicated in Fig. 8. Thus, assuming the line A B to be one edge of a blade, said edge may be disposed perpendicular or at ninety degrees to the horizontal line B C or at any place between the same down to about five degrees, in which case the channel (indicated at D) would be correspondingly altered.

From the foregoing it is throught that the construction, operation, and many advantages of the herein-described invention will be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

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

1. In a rotary engine, the combination with a casing having a piston-chamber, of a piston rotatably mounted in the chamber and having peripheral blades, said casing having curved channels on opposite sides of the piston-chamber, said channels having their outlet-mouths converging and disposed in opposing relation to project opposing and converging jets of motive fluid against the blades.

2. In a rotary engine, the combination with a casing having a piston-chamber, of a piston rotatably mounted in the chamber and having peripheral blades, and means for repeatedly directing separate jets of the same motive fluid inwardly in opposite directions and in opposition to each other against the blades of the piston.

3. In a rotary engine, the combination with a casing having a piston-chamber and motive-fluid channels that communicate with the outer portion of the chamber, said channels having their discharge-mouths inwardly and convergently disposed, of a piston rotatably mounted in the chamber and having blades against which the convergent jets of motive fluid from the channels impact.

4. In a rotary engine, the combination with a casing having a piston-chamber and sets of motive-fluid channels located one behind the other and having inlet and outlet mouths communicating with the outer portion of the chamber, the corresponding channels of each set having their discharge-mouths inwardly and convergently disposed, of a piston rotatably mounted in the chamber and having blades against which the convergent jets of motive fluid from the discharge-mouths impact.

5. In a rotary engine, the combination with a casing having a piston-chamber and sets of curved motive-fluid channels, the channels of each set being located one behind the other and having inlet and outlet mouths, the discharge-mouth of one channel being located in advance of and in spaced relation to the inlet-

mouth of the succeeding channel, and the outlet-mouths of the different sets being arranged in opposing relation to form opposing impinging jets of motive fluid in the piston-chamber, of a piston rotatably mounted in the chamber and having blades against which the said jets of motive fluid from the discharge-mouths impact.

6. In a rotary engine, the combination with a casing having a piston-chamber and motive-fluid channels having discharge-mouths that are inwardly and convergently disposed and communicate with the outer portion of the chamber, said channels successively increasing in cross-sectional area to permit the expansion of the motive fluid therein, of a piston rotatably mounted in the chamber and having blades against which the jets of motive fluid from the discharge-mouths impact.

7. In a rotary engine, the combination with a casing having a piston-chamber and a peripheral wall provided with sets of curved motive-fluid channels, the channels of each set being located one behind the other and increasing successively in cross-sectional area to permit the expansion of the motive fluid therein, the corresponding channels of the sets having convergently-disposed discharge-mouths communicating with the piston-chamber, of a piston journaled in the chamber and having radially-disposed peripheral blades against which the jets of motive fluid from the mouths impact.

8. In a rotary engine, the combination with a casing having a piston-chamber and comprising sections having peripheral wall-sections, each of said sections being provided with similarly-disposed curved fluid-channels that are arranged in opposing relation and communicate with the peripheral portion of the piston-chamber to deliver opposing impinging jets of motive fluid inwardly in opposite directions thereinto, of a piston rotatably mounted in the casing and having blades against which the motive fluid impacts.

9. In a rotary engine, the combination with a casing having a piston-chamber and peripheral wall-sections, each section having a set of curved motive-fluid channels provided with inlet and outlet mouths that communicate with the peripheral portion of the piston-chamber, the outlet-mouths being located in opposing relation on opposite sides of the piston-chamber to deliver opposing jets of motive fluid inwardly in opposite directions thereinto, of a piston rotatably mounted in the casing and having its peripheral portion disposed in line with the jets of motive fluid from the channels.

10. In a rotary engine, the combination with a sectional casing having a piston-chamber therein and peripheral wall-sections, of means securing the peripheral wall-sections together, each of said peripheral wall-sections having a set of curved motive-fluid channels provided with inlet and outlet mouths communicating with the outer portions of the piston-chamber, the discharge-mouth of one channel being disposed in advance of and in spaced relation to the inlet-mouth of the succeeding channel, the corresponding channels of the different sets delivering impinging inwardly-directed jets of motive fluid, a piston rotatably journaled in the chamber, radial blades carried by the piston and operating past the inlet and outlet mouths, and an intermediate impinging rib connecting the blades.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

G. A. KELLY.

Witnesses:
R. M. KELLY,
L. D. KELLY.