No. 855,009. PATENTED MAY 28, 1907.

G. A. KELLY.

ROTARY ENGINE.

APPLICATION FILED JUNE 14, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

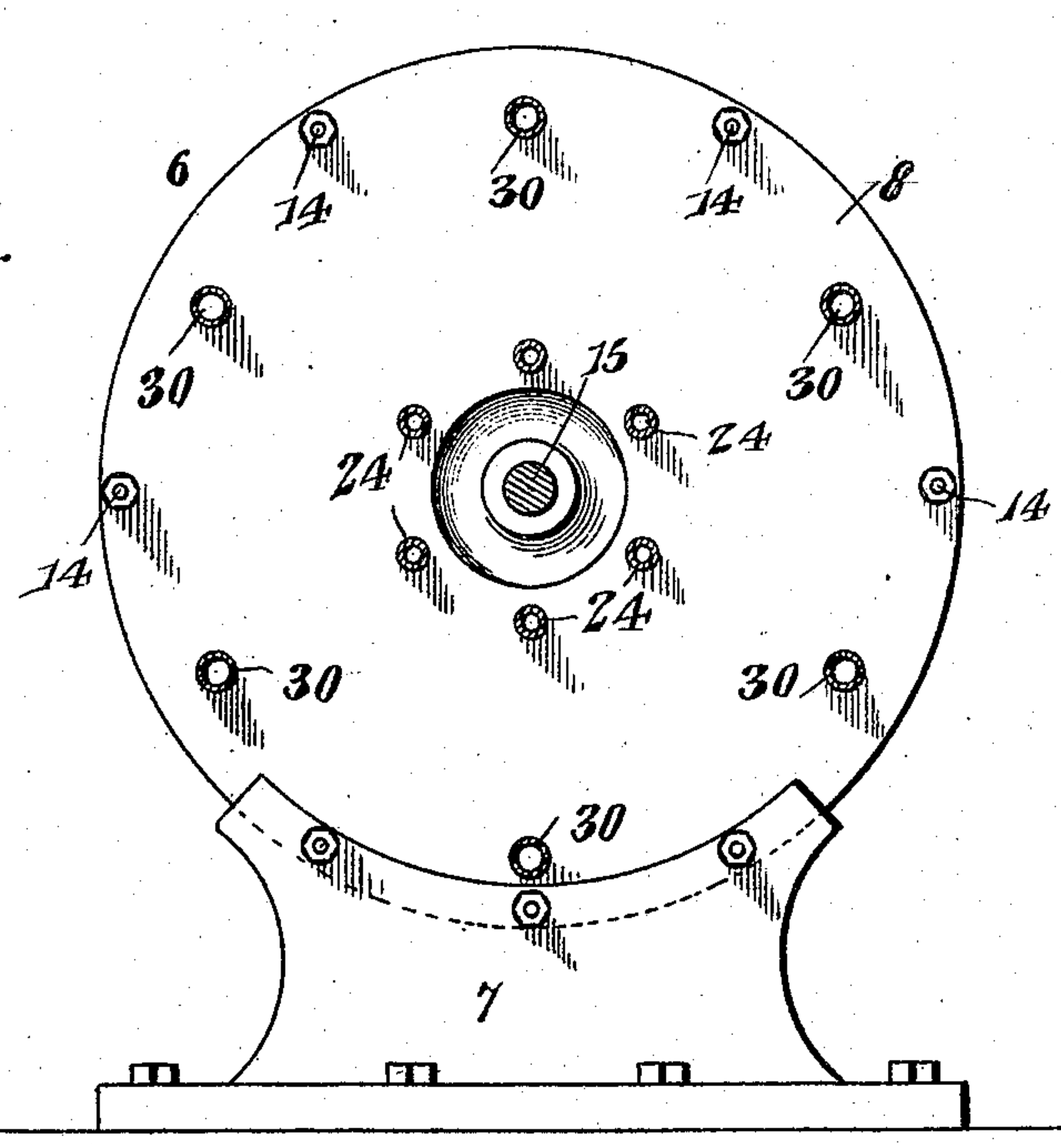


Fig. 4.

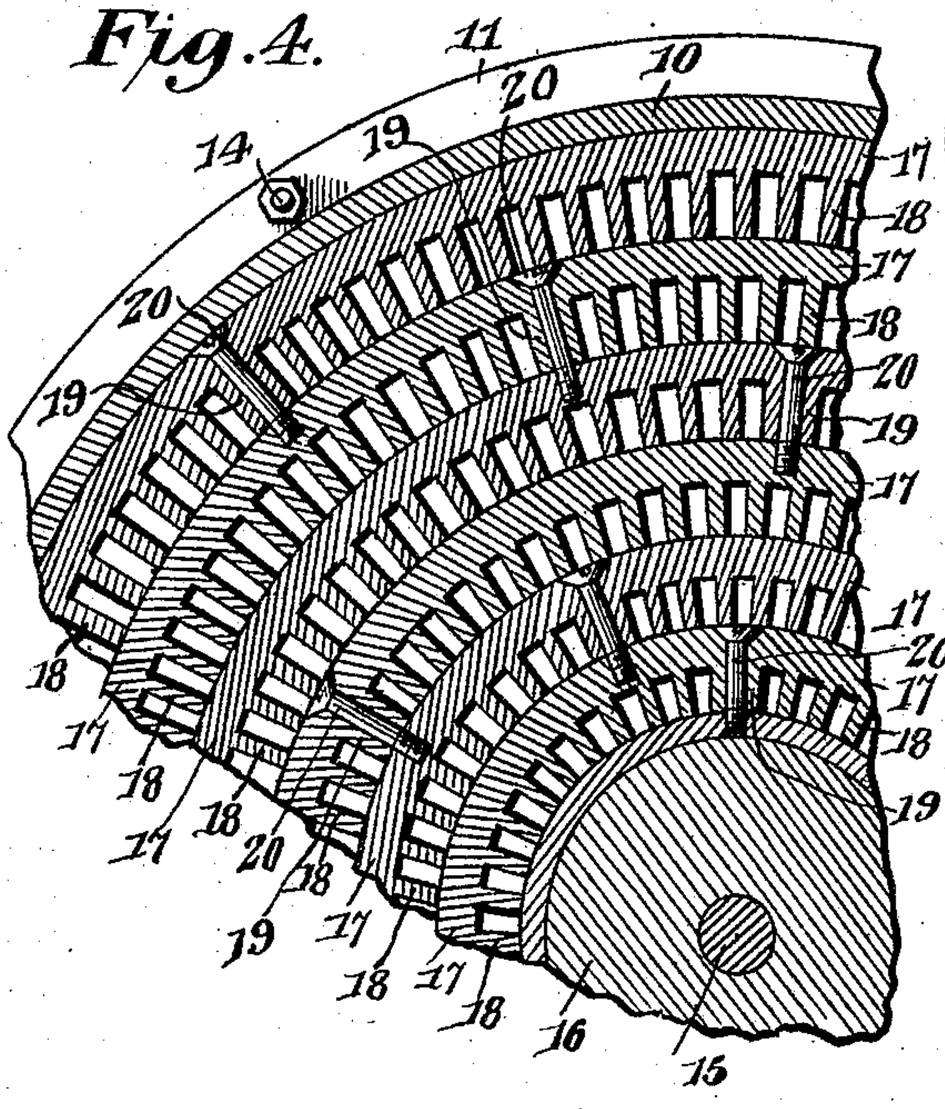
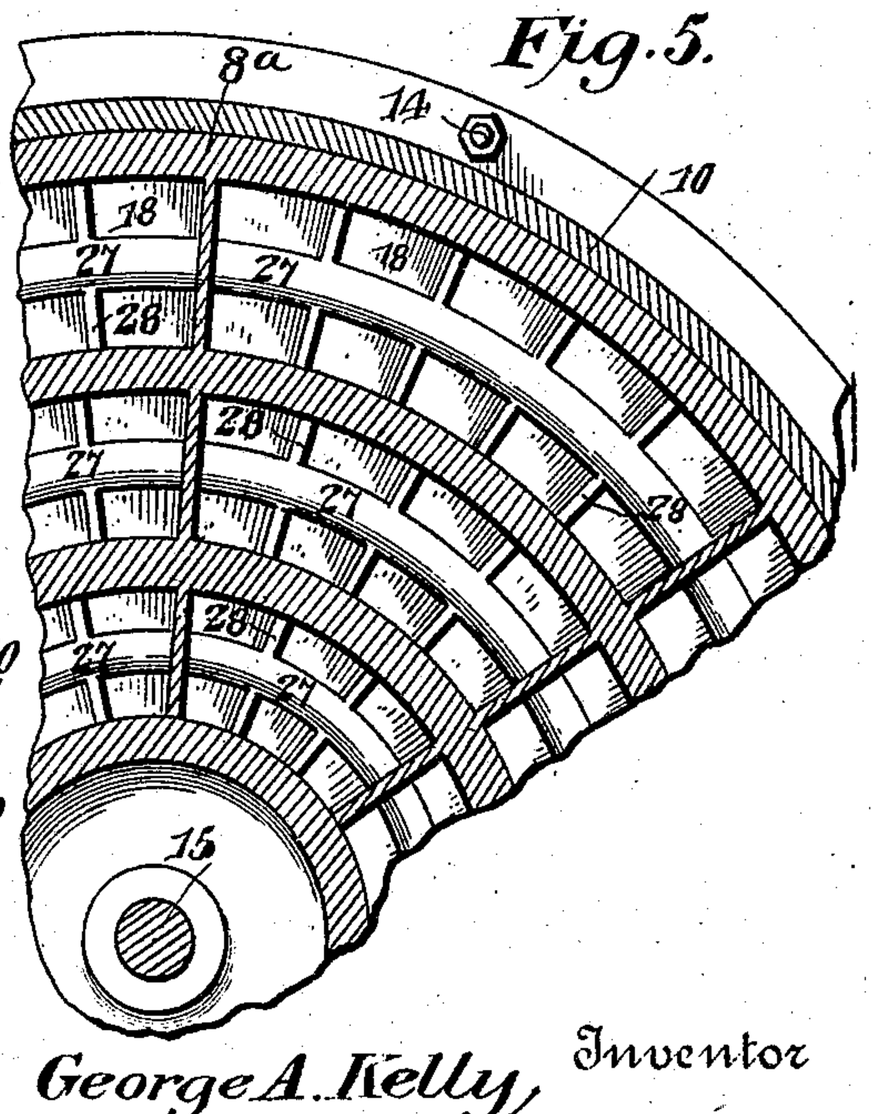


Fig. 5.



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2 SHEETS—SHEET 2.

Fig. 2.

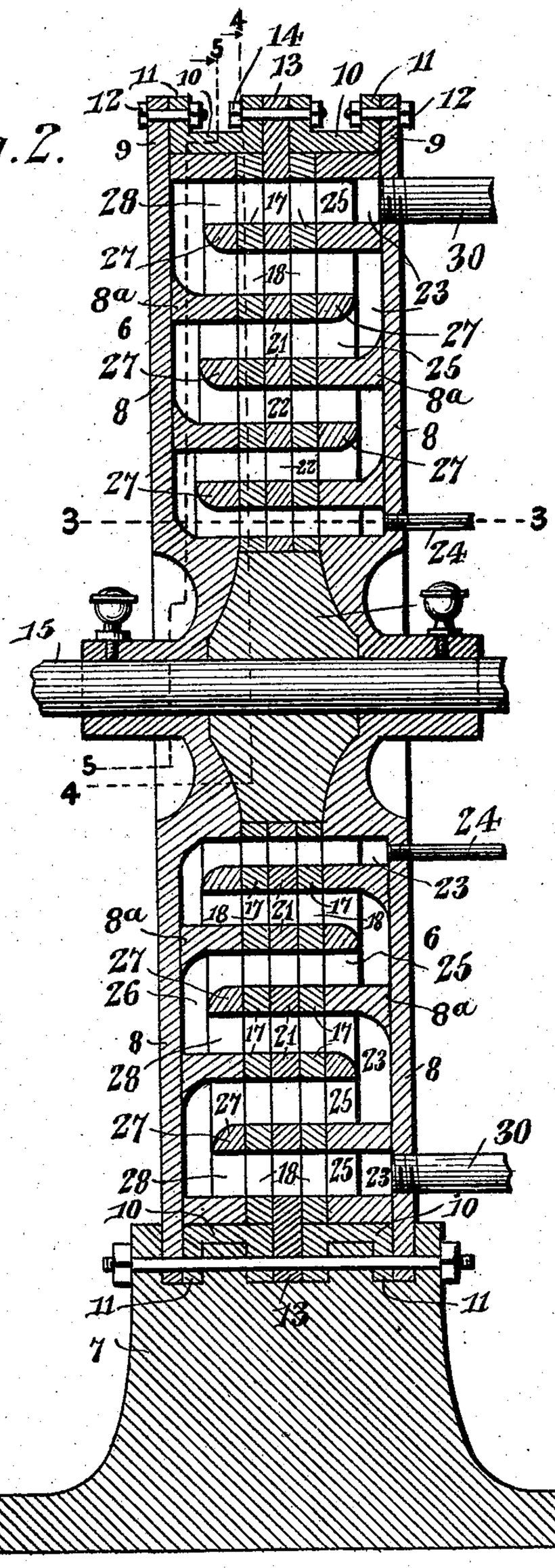
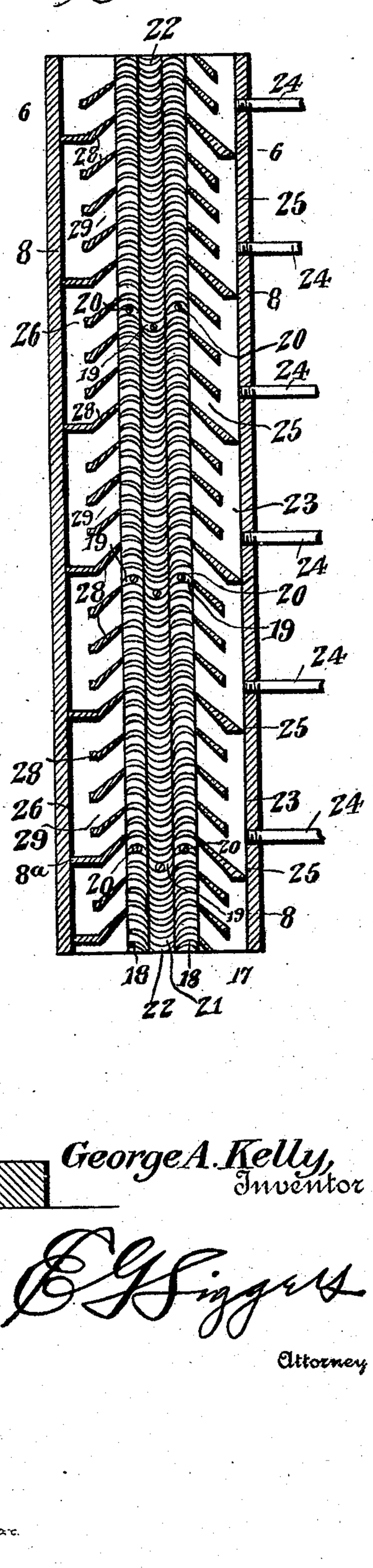


Fig. 3



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UNITED STATES PATENT OFFICE.

GEORGE A. KELLY, OF LONGVIEW, TEXAS.

ROTARY ENGINE.

No. 855,009. Specification of Letters Patent. Patented May 28, 1907.

Application filed June 14, 1906. Serial No. 321,675.

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 to rotary engines, and more particularly to those of the impact or turbine type.

The principal object is to provide an engine that may be made to effectively employ the full expansive force of the steam or other motive fluid in a uniform manner, that is not liable to cross leakage, and consequent loss of power, and that will maintain the heat energy of the motive fluid during its passage through the engine, the engine being so constructed that it may be driven at a comparatively low rate of speed.

The preferred form of construction is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of the engine. Fig. 2 is a vertical sectional view therethrough. Fig. 3 is a development of the parts of a section taken on the line 3—3 of Fig. 2. Fig. 4 is a detail sectional view on the line 4—4 of Fig. 2. Fig. 5 is a detail sectional view on the line 5—5 of Fig. 2.

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

In the embodiment illustrated, a casing 6 is employed, and is mounted on a suitable base 7. Said casing has side walls comprising outer sections 8 and inner sections 8ª, the outer sections having peripheral flanges 9. Peripheral wall sections 10 are provided with flanges 11 bolted to the flanges 9, as shown at 12, or secured in any suitable manner. In the present embodiment, the engine is provided with a double piston wheel, and an intermediate wall 13 is therefore employed, which is clamped between the wall sections 10, and is secured by bolts 14.

The engine shaft is shown at 15, and has mounted thereon between the side walls, a rotary piston. This piston comprises a hub 16, having a pair of wheels mounted thereon and located between the intermediate wall 13 and the side walls 8. It will of course be understood that while two wheels are shown, only one may be employed if desired, and in fact, as many of said walls may be used as is found convenient. As the wheels disclosed are duplicates, a description of one is believed to be sufficient.

A plurality of separate rings 17 are employed, located one outside the other, and having between them independent annular sets of blades 18, said blades being disposed radially of the axis of rotation of the wheel, and being transversely curved, as illustrated in Fig. 3. Certain of the blades, as 19, are made thicker than the others, and the rings are held together by screws 20 or other fasteners that pass through said thicker blades and engage the adjacent rings. It will be of course understood that other means may be employed for securing the said rings together, and that any desired number of rings may be employed. The intermediate wall 13, which is held stationary with the casing, and is located between the wheels, is made up of a plurality of annular rings 21, that are alined with the rings 17, and are held in spaced relation by transversely curved and radially disposed deflectors 22, which, as shown in Fig. 2, are curved in an opposite direction to the blades 18.

The inner portion of one of the inner side wall sections 8ª, is provided with a plurality of sets of independent inlet chambers 23, which are supplied with expansive motive fluid from any suitable source, and by any suitable means, as for instance, supply pipes 24. Inclined slightly flared nozzles 25 have their inlet ends communicating with the chambers 23, while their outlets are alined with the innermost set of blades 18 of one of the piston wheels. The inner sections 8ª of the side walls are furthermore provided with annular and independent sets of channels 28. The channels of each set have their ends disposed in line with different sets of piston blades. The said ends are separated by intermediate partitions 27 that are alined with the rings 17, and said partitions constitute in effect the inner walls of the channels, while the outer sections 8 constitute the outer walls of the channels. Inclined deflectors 28 are located on opposite sides of the partitions, and serve to divide the ends of each channel 26 into a plurality of mouths 29. These deflectors terminate short of the rear walls of the channels 26, leaving unobstructed intermediate portions to said channels. Exhaust conducting means, preferably in the form of pipes 30, are associated with the outermost

set of blades, and on the opposite side to the outermost annular set of channels 26.

In the operation of the engine, the motive fluid is introduced into the chambers 26 by the pipes 24, and will be projected at an inclination against the innermost set of blades of the adjacent wheel by the nozzles 25. Passing across these blades, the steam is turned by the intermediate deflectors 22, and projected against the innermost set of blades of the next wheel, thence escaping into the first channel where it is checked and diverted outwardly, and returned across the second set of blades. The motive fluid is thus passed back and forth until it escapes through the exhaust means 30.

There are many decided advantages for the structure, as disclosed. In the first place, it will be evident that the live steam being admitted to the innermost portion of the wheel is projected, when it is at its highest degree of efficiency, against the smallest set of buckets, and as it passes outwardly, the area of the channels, of necessity, increases so that there is a gradual and uniform expansion of the motive fluid until the exhaust is reached. Furthermore, cross leakage is not liable to take place, as the streams of motive fluid flowing through the wheels and past the blades are so near each other and of so nearly the same pressure that there will be but little tendency for the same to pass outwardly between the wheels and the casing. However, should said leakage take place, it will be caught in the next outer cross stream, and would thereafter be again made to perform its work. Still another advantage is derived from the comparatively large number of checks and turns of the motive fluid, which serves to perpetuate the heat energy of the same, and prevent the accumulation of moisture, an objection which would otherwise occur from the expansion and loss of heat. Still another advantage accruing from this arrangement resides in the fact that the velocity of the motive fluid is considerably checked, thereby securing a lower degree of speed on the part of the shaft, which is an important feature in turbine engines. Still another decided advantage is secured by the particular construction of the side walls, as disclosed. By having them formed of sections, as illustrated, and by forming the chambers and channels in the inner section, these chambers and channels can be formed entirely through the inner sections, and the casting dressing and finishing thereof can be very easily accomplished.

From the foregoing, it is thought 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. For instance the number of wheels employed can be varied as desired, and the number of sets of blades can also be altered in order that the full expansive force of the motive fluid may be secured, under different conditions and different pressures.

Having thus fully 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 rotary piston having a plurality of independent annular sets of blades located one outside the other, of a casing including side walls located on opposite sides of the piston, said side walls having annular sets of channels located one outside the other, each set comprising a successive series of independent channels with partitions separating the adjacent channels, said channels having their ends coöperating with adjacent sets of blades.

2. In a rotary engine, the combination with a rotary piston having a plurality of independent annular sets of blades located one outside the other, of a casing including side walls located on opposite sides of the piston, said side walls having annular sets of channels located one outside the other, each set comprising a successive series of independent channels with partitions separating the adjacent channels, said channels having their ends coöperating with adjacent sets of blades, and deflectors located in the end portions of the channels, said deflectors being shorter than the partitions separating the channels.

3. In a rotary engine, the combination with a rotary piston having a plurality of independent annular sets of blades located one outside the other, and rings arranged between said sets of blades, of a casing including side walls located on opposite sides of the piston, said side walls having annular sets of channels located one outside the other, each set comprising a successive series of independent channels with partitions separating adjacent channels, said channels having their ends coöperating with adjacent sets of blades, annular partitions alining with the rings of the piston and constituting the inner walls of the channels between their ends, and deflectors located in the end portions of the channels on opposite sides of the annular partitions and terminating short of the rear ends of the partitions that separate the channels.

4. In a rotary engine, the combination with a rotary piston having a plurality of independent annular sets of blades located one outside the other, of a casing including side walls disposed on opposite sides of the piston, each wall comprising inner and outer

sections, the inner sections having a plurality of annular sets of channels, partitions separating the channels of each set and extending entirely across the sections, and deflectors located in the channels and terminating short of the outer sides of the sections.

5. In a rotary engine, the combination with a piston comprising a plurality of spaced detachable rings located one outside the other, of annular sets of blades located between the adjacent rings, and fasteners connecting the adjacent rings and securing each to the next, and means for directing motive fluid successively from one set of blades to the next.

6. In a rotary engine, the combination with a rotary piston comprising detachably associated annular rings located one outside the other and having blades disposed between them, certain of said blades being thicker than others, of screws passing through the thicker blades and engaging the rings for holding them together, and means for directing motive fluid against the blades.

7. In a rotary engine, the combination with a casing having a side wall comprising inner and outer sections, of a rotary piston operating in the casing and having a plurality of sets of blades, said inner section having channels formed wholly therein for conducting motive fluid from one set of blades to another, the outer section closing the outer sides of said channels.

8. In a rotary engine, the combination with a casing having a side wall comprising inner and outer sections, of a rotary piston operating in the casing and having a plurality of sets of blades, said inner section having channels formed entirely through and wholly in the same for conducting motive fluid from one set of blades to the other, the outer wall section constituting the outer walls of said channels.

9. In a rotary engine, the combination with a casing having spaced side walls, each of said side walls comprising inner and outer sections, of a rotary piston operating in the casing between the side walls and having a plurality of annular sets of blades, said inner sections having channels formed entirely through and wholly in them and having inlet and outlet mouths coacting with the different sets of blades, the outer wall sections having inner substantially flat faces constituting the outer walls of said channels.

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

GEORGE A. KELLY.

Witnesses:

L. D. KELLY,

R. M. KELLY.