No. 681,843. Patented Sept. 3, 1901.

# J. T. COPITHORN.

## ROTARY MOTOR.

(Application filed Nov. 19, 1900.

(No Model.)

Fig. 1.

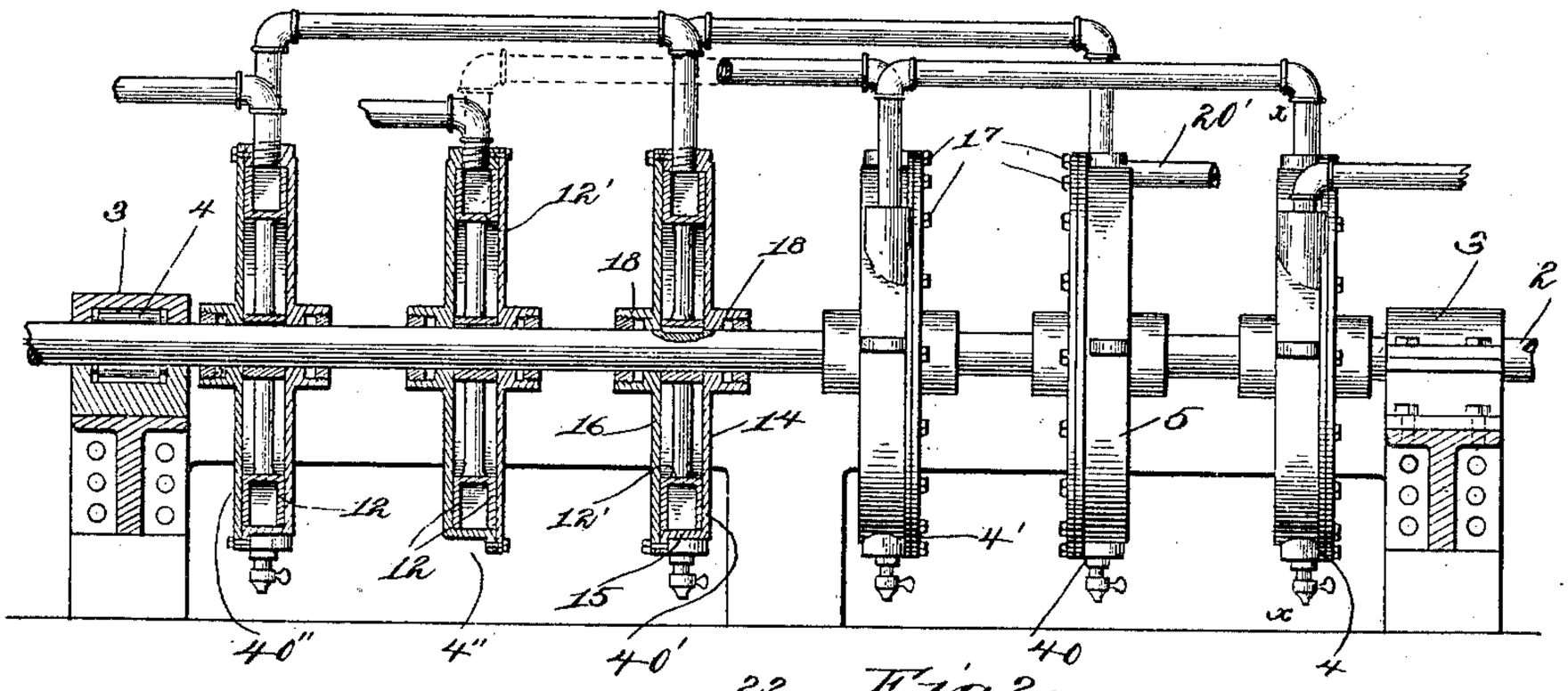
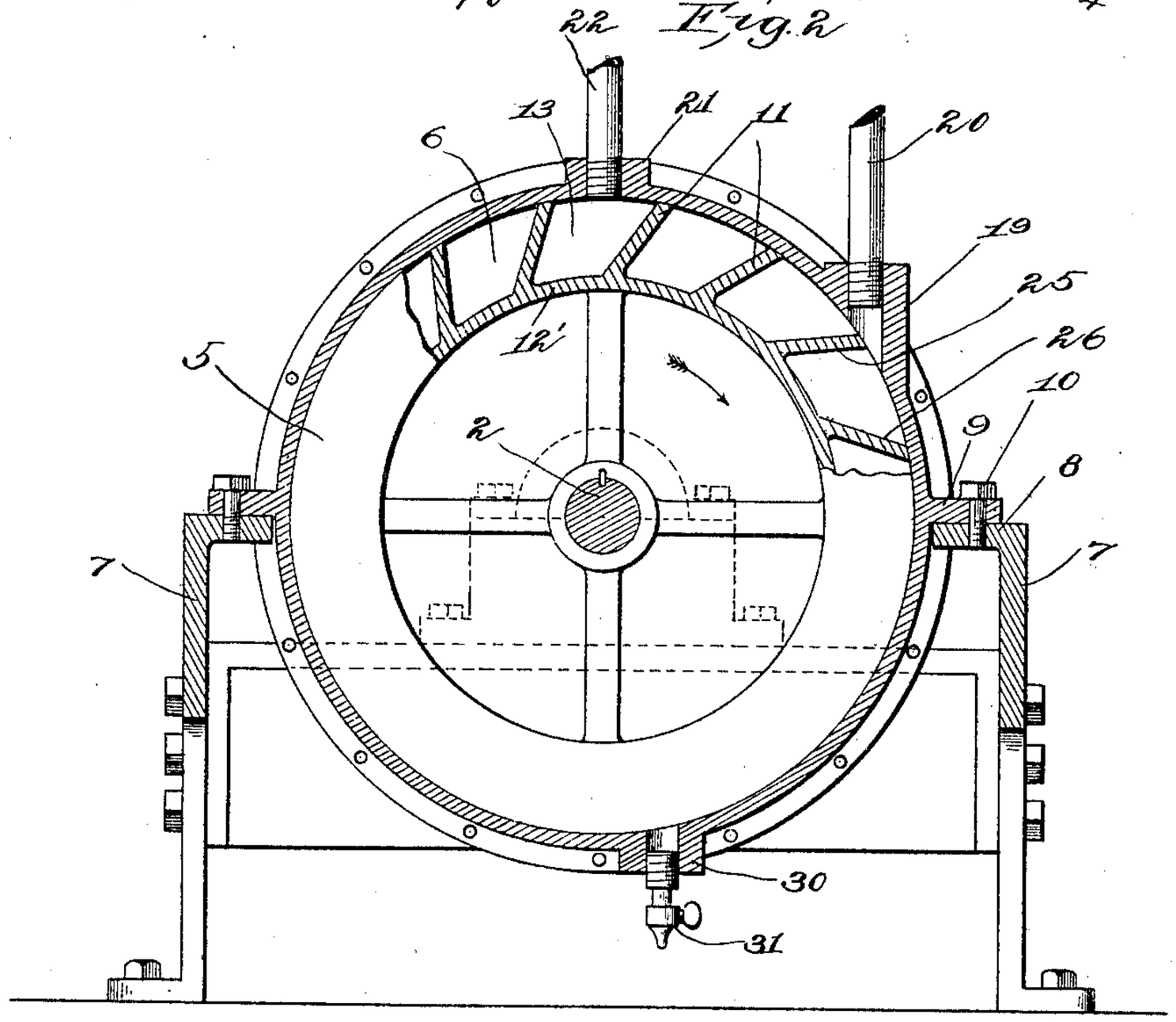



Fig. 2.

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# UNITED STATES PATENT OFFICE.

JOHN T. COPITHORN, OF HINGHAM, MASSACHUSETTS.

## ROTARY MOTOR.

SPECIFICATION forming part of Letters Patent No. 681,843, dated September 3, 1901.

Application filed November 19, 1900. Serial No. 36,969. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN T. COPITHORN, a citizen of the United States, and a resident of Hingham, county of Plymouth, State of Massachusetts, have invented an Improvement in Sectional Rotary Motors, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

This invention relates to rotary engines in which compressed motive fluid, such as steam, is used to obtain the required power; and it includes a series of sections each comprising a housing in which is mounted for rotary movement a rotating element or driver, the said drivers each having a series of pockets on their periphery, into which the motive fluid is injected successively, thereby giving to the drivers a rotary motion. The drivers are preferably all mounted upon the same shaft, and the motive fluid after acting on the first element or driver of the series is conducted to the next section, where it acts against the pockets on the driver therein, the rotation of this second driver assisting in rotating the main shaft, and from the second section the motive fluid is conducted to the third section, and so on through the series, whereby the motive fluid acts in succession on all the drivers of the series and each driver augments the power generated by the other drivers. In cases where I desire to generate a considerable power I merely provide my main shaft with an increased number of sections, each containing a driver. I also provide the main shaft with a second series of sections, in which are mounted drivers similar to those in the first-mentioned series of sections, but having their pockets oppositely disposed, so that by admitting the motive fluid to the second series of sections the shaft will be driven in a reverse direction.

In the drawings, Figure 1 illustrates my rotary motor partly in section and partly in elevation; and Fig. 2 is a section on the line *x x*, Fig. 1, looking in the direction of the arrow.

The main shaft 2, which is geared in any suitable way to the mechanism to be driven, is supported in bearings 3 in any suitable framework, said bearings 3 preferably being provided with suitable antifriction-rolls 4 for the purpose of reducing friction. Mounted upon the main shaft are the different sections which together comprise my engine or motor, the sections of the series being designated by 4 4′ 4″, each of these sections comprising the housing 5, in which is mounted for rotation the rotating element of the engine, which I will term a "driver," such driver being designated generally by 6. The drivers are each made fast to the main shaft 2 in any suitable way, as by the usual key, while the housings 5 are stationary and are bolted to the side pieces 7 of the framework, as illustrated in Fig. 2. For this purpose the said side pieces preferably have the inturned flanges 8, upon which rest the ears or lugs 9, integral with the housings 5, the said lugs being secured to the flanges in any suitable way, as by bolts 10. Each driver or rotating element 6 has at its periphery a series of blades 11, against which the motive fluid acts in order to give rotation to the said driver in a manner hereinafter described.

My preferred manner of constructing the driver is illustrated in the drawings, wherein it has in its periphery a channel or groove formed by the radial side flanges 12 and the bottom 12′, the said channel being divided into a series of independent compartments or pockets 13 by the partitions or blades 11. Preferably the blades or partitions 11 will be inclined to the radius of the rotating member, the advantage of such inclined disposition of the blades being hereinafter pointed out. Each housing 5 is shown as comprising the body portion 14, having the peripheral flange 15, the said flange being of a depth substantially equal to the width of the rotating member, and the inside diameter of the said housing approximately is equal to the exterior diameter of the driver 6, whereby the ends of the blades 11 fit the inside of the flange 15. A cap-plate or cover 16 is secured to the body portion 14 of the housing in any suitable way, as by bolts 17, by means of which construction it will be seen that the driving member is entirely inclosed by the tight housing 5, and as the outer edges of the partitions or blades 11 fit the interior periphery of the housing each pocket is practically independent from the others and has no communication

therewith. I would here remark that the housing may be of a width slightly greater than the thickness of the periphery of the driver, and in practice the driver is made to rotate in the housing with an easy fit, so as to reduce the friction to a minimum, the ends of the blades 11 fitting the inner periphery of the housing with an easy fit, but not having sufficient contact therewith to create any amount of friction. I may, if desired, provide each side of the housing 5 with enlarged hubs 18, which may be provided with a suitable packing and in which are contained any suitable roller-bearings for the shaft, and as the housings are stationary they form added supports for the shaft between the end bearings 3. Each housing is provided with the tangentially-arranged boss 19, which receives the inlet pipe or conduit 20, and the boss 21, which receives the outlet or discharge conduit 22.

As stated above, the blades 11, against which the motive fluid acts to give rotation to the driver, are inclined, with the result that each blade is presented to the inlet-opening nearly perpendicular thereto, so that the compressed motive fluid will act against the said blade most effectively.

Referring to Fig. 2, it will be seen that the blade 25 has just reached the position where the motive fluid will act thereon, and it will be noted that the said blade stands nearly perpendicular to the inlet-opening. The force of the fluid acting against the blade will give a motion of rotation to the driver in the direction of the arrow in said figure, and the blade 25 will move from the position shown in said figure to the position occupied by the blade 26, and during the movement of the blade from its first position to its second position the motive fluid is discharged against it in a line substantially perpendicular thereto, so that the force of the motive fluid is expended in the most efficient way. When the blade 25 has reached the position of the blade 26, the next blade has moved into position 25 and is ready to be acted upon by the motive fluid. It will thus be seen that the various blades are brought under the inlet-opening in succession and a series of impulses are given to the driver member, thereby rotating the same. The compressed fluid, which is discharged against each blade in succession, is carried with the driving member in the pockets 13 until the outlet or discharge opening is reached, when the said fluid will pass through the discharge-conduit 22. Inasmuch as the pockets are independent from each other the compressed fluid is prevented from expanding as it is carried around therein from the inlet to the discharge opening, and therefore it will be exhausted from each section at nearly the same pressure at which it was delivered to the section. I therefore connect the outlet 22 of the first section 4 of the series with the inlet 20 of the section 4′, and in turn connect the outlet of the section 4′ with the inlet of the section 4″, &c. The motive fluid, therefore, after passing through the first section is taken to the second section at nearly its initial pressure, where it does duty a second time, and so on through the series.

It will be evident from the above description that when it is desired to generate a large amount of power it is only necessary to increase the number of sections upon the main shaft.

In order to provide a simple means for reversing the direction of rotation of the main shaft, I provide the said shaft with a second series of sections 40 40′ 40″, similar in all respects to the sections 4 4′ 4″, except that the blades of the drivers are oppositely disposed, the inlet 20′ of the second series having the same relation to the blades of said series as the inlet 20 of the first series does to the blades 11. It will now be evident that by admitting the motive fluid to the inlet 20′, and thus to the second series of sections, the shaft will be driven in the reverse direction from that in which it is driven when the motive fluid is admitted to the sections of the first series. Suitable valve mechanism will be employed to control the admission of the fluid to either series of sections, as desired. Each section is provided with a depending boss 30, in which is secured a petcock 31 for the purpose of drawing off the condensed steam, where steam is used as the motive fluid.

Various changes may be made in the construction of the device without departing from the spirit of the invention.

It will be obvious that my motor is adapted to be used with any other suitable compressed motive fluid besides steam.

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

1. In a rotary engine, two series of independent sections, each comprising a stationary housing, and a rotary driving member inclosed therein, a main shaft to which all of said driving members are made fast, each driving member having a series of inclined blades projecting from its periphery, and said sections each having an outlet and a tangentially-arranged inlet, the outlet of each of said sections of each series being connected to the inlet of the next succeeding section in the same series, the blades of the driving members of one series being oppositely disposed to the blades of the driving members of the other series, and a drip-cock attached to the lower end of each housing.

2. In a rotary engine, two series of independent sections each comprising a stationary housing and a rotary driving member inclosed therein, a main shaft to which all of said driving members are made fast, each driving member having a series of inclined blades projecting from its periphery and said sections each having an outlet and an inlet, the outlet of each section of each series being connected

to the inlet of the next succeeding section in the same series, and the blades of the driving members of one series being oppositely disposed to the blades of the driving members of the other series.

3. A sectional rotary motor composed of a main shaft having two series of sections mounted thereon, each section comprising a stationary housing loose on the shaft, and a driving member inclosed in said housing and fast on said shaft, said driving member having a series of pockets, the walls of which fit tightly against the inner periphery of said housing, each section having an inlet and an outlet, the inlet arranged so as to direct the motive fluid squarely against the walls of the pockets, the outlets of one section being connected to the inlet of the next adjacent section of the same series, and pockets of the driving members of one series being oppositely disposed to those of the other series.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN T. COPITHORN.

Witnesses:
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