

H. E. FLEDDERJOHANN.  
 TWIN CYLINDER REVERSIBLE TURBINE.  
 APPLICATION FILED MAR. 13, 1913.

1,064,824.

Patented June 17, 1913.

3 SHEETS-SHEET 1.

Fig. 1.

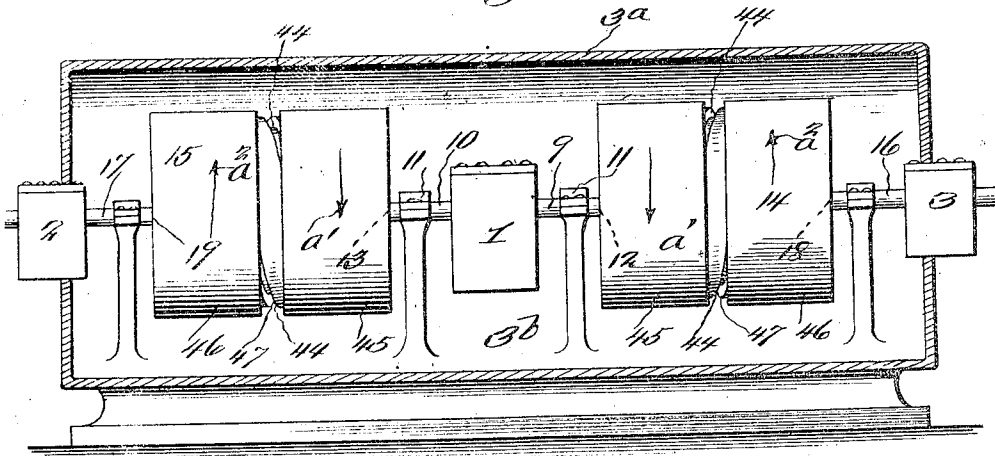
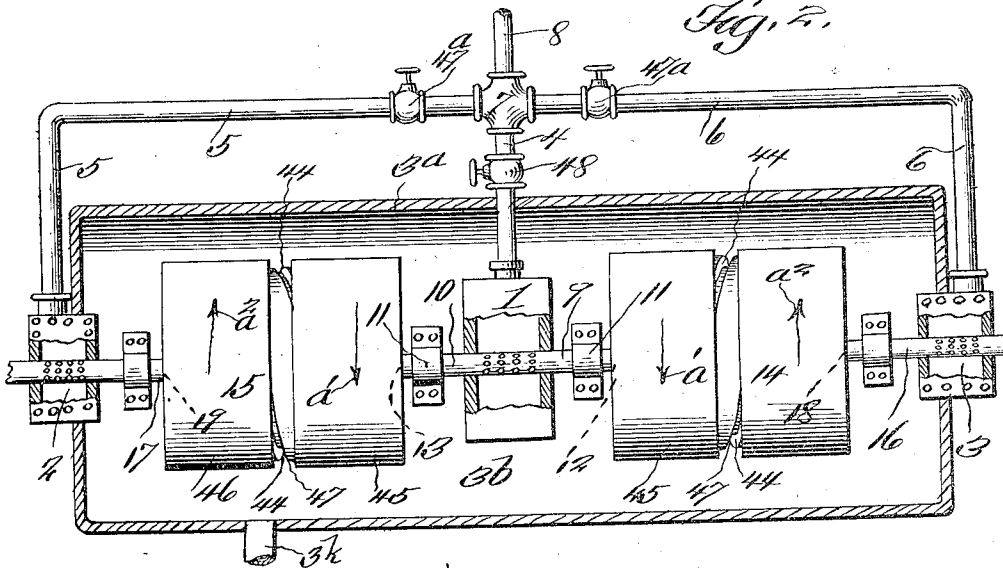


Fig. 2.



Witnesses  
 Mark De Grange,  
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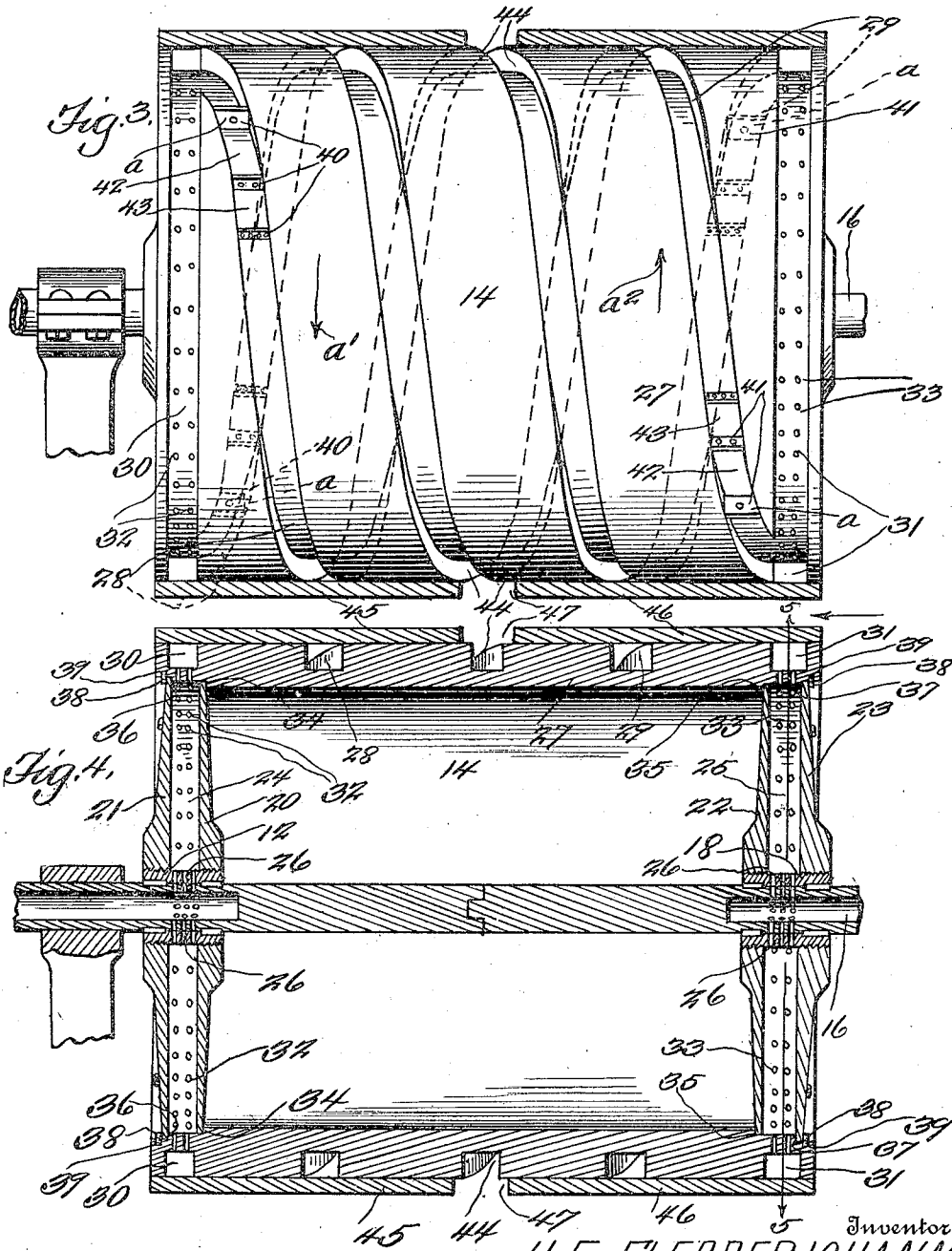
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3 SHEETS—SHEET 2.



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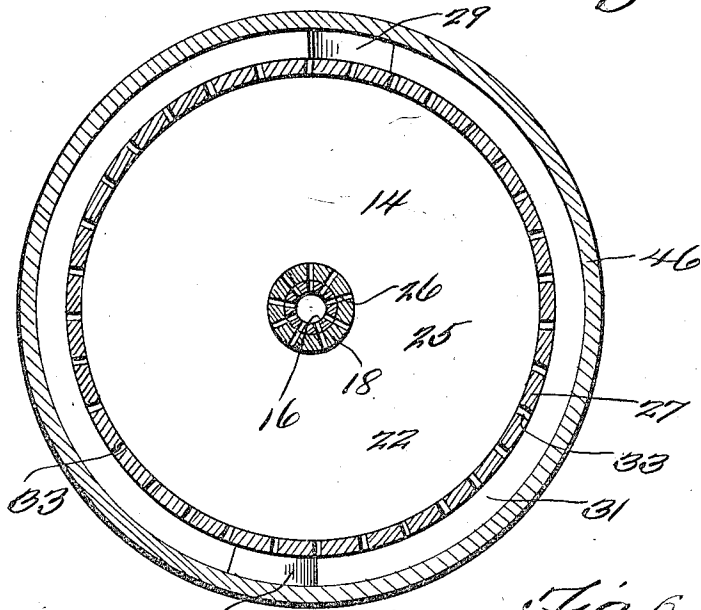
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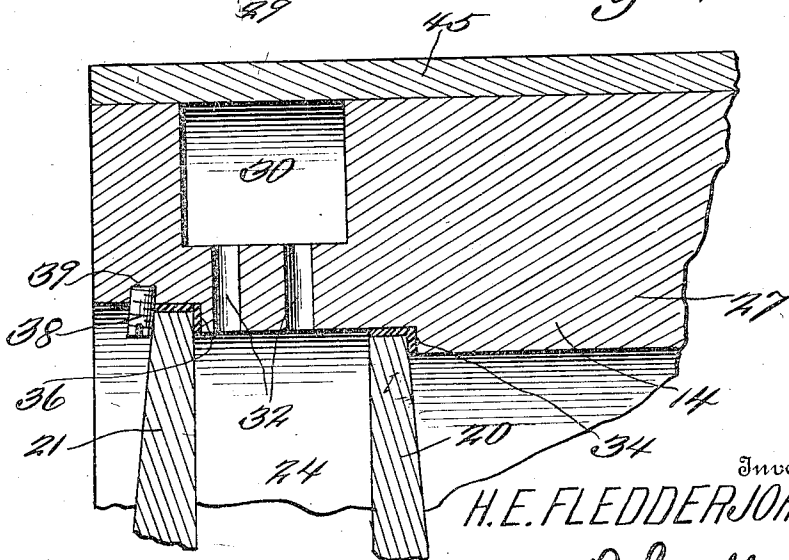
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3 SHEETS—SHEET 3.

*Fig. 5.*



*Fig. 6.*



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# UNITED STATES PATENT OFFICE.

HENRY E. FLEDDERJOHANN, OF NEW KNOXVILLE, OHIO.

TWIN-CYLINDER REVERSIBLE TURBINE.

1,064,824.

Specification of Letters Patent. Patented June 17, 1913.

Application filed March 13, 1913. Serial No. 754,069.

*To all whom it may concern:*

Be it known that I, HENRY E. FLEDDERJOHANN, a citizen of the United States, residing at New Knoxville, in the county of Auglaize and State of Ohio, have invented a new and useful Twin-Cylinder Reversible-Spiral Turbine-Engine; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to new and useful twin cylinder reversible spiral turbine engine.

As an object of the invention it is the aim to provide two cylinders, connected by a hollow spindle shaft, which not only acts as a shaft, but constitutes means to convey the steam to the cylinder.

Another object of the invention is to provide each cylinder with spiral steam passage-ways, in which, at their inlet portion, transversely disposed steam abutment plates are arranged. To drive the cylinders in one direction, the steam from the hollow spindle shaft, is let into the steam passage-ways at one end of each cylinder, and to reverse the engine or the motion of said cylinders, the steam is let into the passage-ways, at the other end of each cylinder.

Another object of the invention is the fact that this type of engine can be so constructed, as to be placed in the lower part of a boat, out of the way, because it requires but little room or space, and not such a very strong or massive foundation, especially because there is scarcely any jar, provided the engine is well balanced.

Another object of the invention is the fact that this engine may be reversed at a moment's warning, whether at sea or upon rivers. Furthermore, the engine may be used upon locomotives with exceedingly great efficiency.

Another feature of the invention, is the eliminating of the side thrust, found in other types of engines, owing to the provision of the hollow spindle or shaft connecting between the cylinders.

There are disclosed in the drawings certain features of construction, but in practical fields these features may necessitate alterations, to which the patentee is entitled, provided the alterations fall within the scope of what is claimed.

The invention comprises further features

and combination of parts, as hereinafter set forth, shown in the drawings and claimed.

In the drawings:—Figure 1 is a view in perspective of the improved twin cylinder reversible spiral steam turbine engine, constructed in accordance with the invention. Figure 2 is a plan view showing parts in section. Figure 3 is a view of one of the cylinders showing the jacket, which covers the spiral groove in section. Figure 4 is a longitudinal sectional view entirely through one of the cylinders showing the interior construction thereof, and also showing clearly how the steam can be carried to one end of each cylinder to enter the passage-ways, to rotate the cylinders in one direction, and further showing how the steam can be controlled, to enter the other end of each cylinder and the passage-ways thereof to rotate the engine in the opposite direction. Figure 5 is a transverse sectional view on line 5—5 of Fig. 4. Figure 6 is an enlarged detail sectional view of a portion of one of the cylinders.

Referring more particularly to the drawings, 1, 2 and 3 designate steam chests, of any conventional or suitable construction, and into which steam is conveyed by way of the pipes or conduits 4, 5 and 6, which unite at 7 to a single steam pipe 8. The steam chest 1 has a hollow spindle shaft extending from each end, one designated by the numeral 9 while the other is denoted by the numeral 10. The spindle shafts are mounted in bearings 11, and are extended into the members or bearings 12 and 13 of the cylinders 14 and 15. Extending from the steam chests 2 and 3 are hollow spindles 16 and 17, which fit the members or bearings 18 and 19 of the cylinders 14 and 15. The members or bearings 12 and 13, and 18 and 19 consist of short sleeves, the ends of which are threaded or otherwise secured in the plates 20 and 21, and 22 and 23 of the cylinders. These members or bearings 12 and 13, and 18 and 19 are provided with perforations in their circumferential walls, through which perforations the steam passes from the spindles 9 and 10, and 16 and 17, and into the spaces 24 and 25, between the plates 20 and 21 and 22 and 23. The perforations of the members or bearings 12 and 13, and 18 and 19 are designated by the character 26.

The cylinders 14 and 15 comprise the hollow cylindrical shells 27, in the outer circumference of which spiral steam passages or grooves 28 and 29 are formed. The thick-

nesses of the walls of said shells are sufficient, in order that the passages or grooves may be constructed with sufficient depth, in order to receive a large body or quantity of steam. The passages 28 and 29 at each end of each cylinder merge from the annular passage-ways 30 and 31, into which the steam enters by way of the perforations 32 and 33, from the spaces 24 and 25. The plates 20 and 22 are arranged in the ends of said cylinders, against the shoulders 34 and 35, while the plates 21 and 23 are arranged against the shoulders 36 and 37, being held in such positions, by virtue of the members 38 in the recesses 39 of the said shells of the cylinders. This method of construction insures a light, yet strong and extremely durable revoluble cylindrical body, which will not only revolve with great speed, but will rotate even or with uniformity.

Located at the inlet end of each passage 28 and 29 is a series of transversely disposed steam abutment blades or members 40 and 41, against which the steam acts as it enters each passage-way 28 and 29, in order to impart revoluble motion to each cylinder. The first blade *a* of each series is provided with a single aperture, while the next blade is provided with two apertures, whereas the third blade is supplied with four apertures. The number of these blades in each series may be increased or decreased, as the case may require. It is obvious why only one aperture is provided in each of the first blades *a*. For instance, the provision of only one aperture only allows a certain amount of steam or other fluid to pass through the first blade *a* into the space or pocket between the first blade and the second blade, thereby insuring a greater body of steam behind the first blade *a*, the expansion of which will impart motion to the cylinder, while the increased number of apertures in the second and third blade allows a greater quantity of steam to escape from the said pockets 42 and 43. The steam passing through the third blade freely passes through the remaining portion of each spiral passage idly and exhausts at the outlet 44 of each passage. Shrunk or otherwise securely fitted upon the shells of said cylinders are cylindrical jackets 45 and 46 spaced apart at 47, in order to cover the spiral passages.

When the cylinders are rotating in the direction indicated by the arrows  $a^1$ , steam is being let into the passages at the adjacent ends of the cylinders, but to impart motion to the cylinders in the direction indicated by the arrow  $a^2$ , steam is allowed to enter the passages 29 at the outer ends of the cylinders.

The pipes 5 and 6 are provided with valves 47, while the pipe 4 is provided with a valve 48.

To cause the steam to enter the passage-ways 28 at the adjacent ends of the cylinders, the valves 47<sup>a</sup> are closed, while the valve 48 is open. To admit steam to the passages 29 at the outer ends of said cylinders, the valve 48 is closed while the valves 47 are open.

From the foregoing, it will be ascertained that there has been devised a simple and inexpensive yet extremely durable twin or multiple cylinder reversible spiral steam turbine engine, and one which has been found desirable and practical, owing to its exceptional adaptability upon sea-going vessels and the like, as well as upon locomotives.

It will be observed that the entire engine is inclosed in an air tight casing 3<sup>a</sup> having a vacuum chamber 3<sup>b</sup>, into which the exhaust steam passes. The steam on entering the vacuum chamber is immediately condensed. This action makes the vacuum chamber about 13 pounds less than air pressure. By the constant use of a vacuum pump (not shown), adapted to be connected to the vacuum chamber by means of an exhaust pipe 3<sup>c</sup>, shown in Fig. 2, the power of this engine may be greatly increased.

The invention having been set forth, what is claimed as new and useful is:—

1. In an engine, a hollow revoluble cylinder body comprising a shell having spiral steam passages, said steam passages having inlet mouths at each end of the cylinder, from which mouths the passages merge and extend spirally about the shell and terminate in exhaust ports substantially centrally of the shell, jackets shrunk upon the shell to cover said passages and having a space between the shells, said cylinder body having steam chambers or spaces, one at each end in communication with said passages, a steam pipe or spindle to convey steam into one of said chambers from whence it passes into one of said passages to rotate the cylinder in one direction, and a second steam pipe or spindle to convey steam in the other steam chamber and thence into the passages at the other end of the cylinder to rotate the same in the opposite direction when the steam in the first pipe or spindle is cut off, and abutment blades having apertures arranged in said passages adjacent their inlet mouths against which the steam acts.

2. In an engine, a hollow revoluble cylinder body comprising a shell having spiral steam passages, said steam passages having inlet mouths at each end of the cylinder, from which mouths the passages merge and extend spirally about the shell and terminate in exhaust ports substantially centrally of the shell, jackets shrunk upon the shell to cover said passages and having a space between the shells, said cylinder body having steam chambers or spaces, one at each

end in communication with said passages, a steam pipe or spindle to convey steam into one of said chambers from whence it passes into one of said passages to rotate the cylinder in one direction, and a second steam pipe or spindle to convey steam in the other steam chamber and thence into the passages at the other end of the cylinder to rotate the same in the opposite direction when the steam in the first pipe or spindle is cut off, and abutment blades having apertures arranged in said passages adjacent their inlet mouths against which the steam acts, said shell having annular passages, one at each end of the cylinder body communicating between the spiral passages and the steam chamber at each end, and a steam chest from which each steam spindle extends.

3. In an engine, a hollow revoluble cylinder body comprising a shell having spiral steam passages, said steam passages having inlet mouths at each end of the cylinder, from which mouths the passages merge and extend spirally about the shell and terminate in exhaust ports substantially centrally of the shell, jackets shrunk upon the shell to cover said passages and having a space between the shells, said cylinder body having steam chamber or spaces, one at each end in communication with said passages, a steam pipe or spindle to convey steam into one of said chambers from whence it passes into one of said passages to rotate the cylinder in one direction, and a second steam pipe or spindle to convey steam in the other steam chamber and thence into the passages at the other end of the cylinder to rotate the same in the opposite direction when the steam in the first pipe or spindle is cut off, and abutment blades having apertures in said passages adjacent their inlet mouths against which the steam acts, said shell on its interior having annular shoulders adjacent the ends thereof, second annular shoulders formed at the extreme outer ends of said shell, annular plates two arranged against said shoulders at each end of the shell, between which steam chambers are formed, device for securing two of said plates against the shoulders of the extreme ends of the shell, and perforated sleeves, one connecting the plates at each end of the shell, and into which sleeves the spindles extend.

4. In an engine, a hollow revoluble cylinder body comprising a shell having spiral steam passages, said steam passages having inlet mouths at each end of the cylinder, from which mouths the passages merge and extend spirally about the shell and terminate in exhaust ports substantially centrally of the shell, jackets shrunk upon the shell to cover said passages and having a space between the shells, said cylinder body having

steam chamber or spaces, one at each end in communication with said passages, a steam pipe or spindle to convey steam into one of said chambers from whence it passes into one of said passages to rotate the cylinder in one direction, and a second steam pipe or spindle to convey steam in the other steam chamber and thence into the passages at the other end of the cylinder to rotate the same in the opposite direction when the steam in the first pipe or spindle is cut off, and abutment blades having apertures in said passages adjacent their inlet mouths against which the steam acts, said shell on its interior having annular shoulders adjacent the ends thereof, second annular shoulders formed at the extreme outer ends of said shell, annular plates two arranged against said shoulders at each end of the shell, between which steam chamber are formed, devices for securing two of said plates against the shoulders of the extreme ends of the shell, and perforated sleeves, one connecting the plates at each end of the shell, and into which sleeves the spindles extend, said shell having annular passages, one at each end of the cylinder body communicating between the spiral passages and the steam chamber at each end, and a steam chest from which each steam spindle extends.

5. In a multiple cylinder engine, a multiple of hollow revoluble cylinder bodies, each comprising a shell having spiral steam passages, said steam passages having inlet mouths at each end of said shell, from which mouths the passages merge and extend spirally about the shell and terminating in exhaust ports substantially centrally of the shell, said shell at each end having an annular passage into which said mouths open, cylindrical jackets shrunk upon the shell to cover the annular passages and the spiral passages and having a space left between said jackets, said shell upon its interior having two annular shoulders at each end, spaced apart annular plates fixed against said shoulders at each end of the shell, steam chambers or spaces between said plates in communication with the annular passages, sleeves connecting the plates at the ends of said shell and provided with perforations, transversely disposed blades arranged in the spiral passages adjacent the inlet mouths and provided with perforations, said blades acting as steam abutment members, a steam chest located between the multiple cylinder bodies and having a steam spindle extending into the sleeves of the adjacent ends of the multiple cylinders and communicating with the steam chambers to convey steam thereinto and thence into the spiral passages against said blades to rotate the cylinders in one direction, steam chests arranged at the outer ends of the multiple of cylinders and having steam spindles extending into the

sleeves of the outer ends of said cylinders to convey steam in the outer end steam chambers, from whence the steam passes into the spiral passages extending from the outer ends of said cylinders to rotate the cylinders in the opposite direction when the steam is cut off in the first steam spindle.

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

HENRY E. FLEDDERJOHANN.

Witnesses:

JAMES SLACK,  
HERBERT KOLL.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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