

(No Model.)

G. C. PYLE.
STEAM TURBINE.

No. 550,564.

Patented Nov. 26, 1895.

Fig 1.

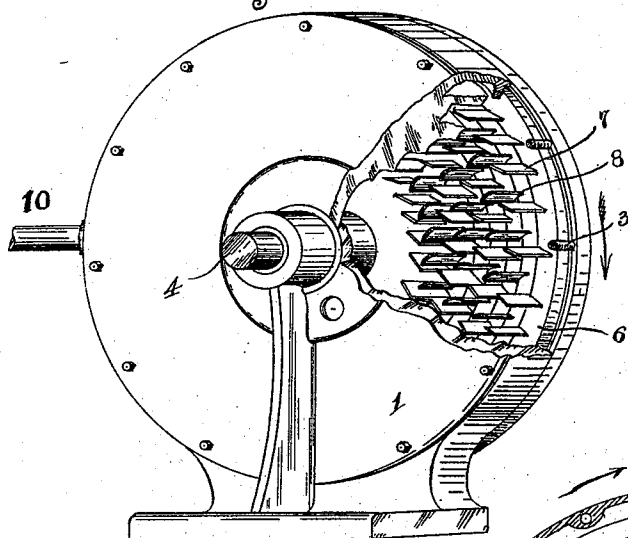


Fig 3.

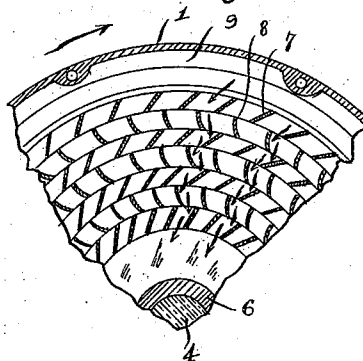
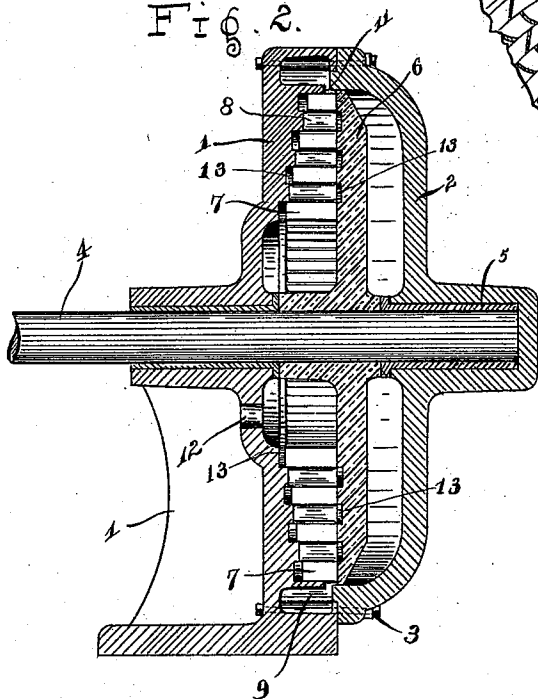


Fig 2.



Witnesses
A. S. Courtright
Lela Monroe.

Inventor
George C. Pyle
By Attorney W. H. Lockwood

UNITED STATES PATENT OFFICE.

GEORGE C. PYLE, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF ONE-HALF TO
FRANK H. EWERS, OF SAME PLACE.

STEAM-TURBINE.

SPECIFICATION forming part of Letters Patent No. 550,564, dated November 26, 1895.

Application filed October 1, 1894. Serial No. 524,615. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. PYLE, of Indianapolis, county of Marion, and State of Indiana, have invented certain new and useful Improvements in Steam-Turbines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like numerals refer to like parts.

My invention relates to a steam-turbine of a novel pattern which enables me to considerably increase the power of the wheel or reduce its dimensions. It is made, primarily, for use in an electric-headlight system where compactness and great velocity are essential and the steam is furnished by the locomotive.

A feature of my steam-turbine consists in utilizing all the force of the steam to drive the wheel. The steam is introduced so that it will engage the buckets on the periphery of the wheel and be deflected therefrom inward toward the center, and as it passes inward it will by suitable means continue to actuate the wheel until it has lost about all its force and velocity. By this construction I can procure the same amount of power with a smaller wheel than heretofore.

The features of my invention will appear from the drawings and the description following.

Figure 1 is a perspective of my steam-turbine with a part of the casing broken away to show the wheel. Fig. 2 is a cross-section, and Fig. 3 a section of a part of the wheel.

The casing of my wheel consists of two sections—the side 1, mounted on a suitable base, and secured to the side 2 by means of bolts 3, so as to be steam-tight.

4 is a shaft on which I mount my dynamo; but it may be used to drive any kind of machinery. It works in suitable bushing-bearings 5 in the casing and carries the wheel 6. The wheel is shown provided with four series of buckets 7, arranged concentrically one series within the other. These buckets extend laterally or outwardly from the body of the wheel 6, flange-like. Between them series of stationary deflectors 8 extend from the casing 1, likewise in annular series, in order to change the direction of the steam after it has left the preceding series of buckets. On the ends of

each series of buckets 7 and each series of stationary deflectors 8 is a ring or band 13, whose width is the same as that of the space between the series of buckets or deflectors 55 between which it fits and rotates. The purpose of this ring is to confine the steam between the buckets and deflectors and prevent it from pressing the wheel and casing 1 apart, thus causing leaking of steam around the 60 ends of the buckets and deflectors and also fatal pressure of the wheel against the casing 2.

Formed within the casing circumferentially about the wheel is a steam chamber or passage-way 9, into which the steam enters through the steam-pipe 10. The steam immediately diffuses throughout this chamber and enters the wheel through a narrow slot or opening 11 in the casing extending about 70 the wheel. The steam when it enters the wheel tends to go toward the center and pass out of the exhaust-port 12. The buckets are straight and set at an angle to the radius of the wheel—that is, they extend in a direction 75 considerably to one side of the center, as shown in Fig. 3. The steam strikes against these inclined buckets and is deflected by the buckets in the direction in which the buckets normally extend—inwardly. It then 80 is deflected by the first series of deflectors in a direction somewhat that of the movement of the wheel, whereupon it engages the second series of buckets and gives through them increased impetus to the wheel. For this purpose 85 the deflectors are concaved and set in a position substantially the reverse of the buckets. From this second series of buckets it is deflected back against the second series of deflectors and from them again deflected 90 somewhat in the direction of the movement of the wheel until it contacts with the third series of buckets, and so on until it leaves the fourth or last series of buckets, whereupon it enters the central chamber about the 95 hub of the wheel and leaves through the exhaust-port 12. The deflectors, therefore, it is seen, are stationary and are utilized merely to change the direction of the movement of the steam, so that it will tend to give increased 100 impetus to the wheel when it strikes the next series of buckets. The buckets and deflec-

tors are parallel with the shaft of the wheel. The dimensions of the buckets and deflectors increase toward the center in proportion to the normal expansion of the steam. It will
5 be observed that the first series of buckets travels faster than the second and the second faster than the third, and so on, decreasing in speed as the center of the wheel is approached. The steam when it engages the
10 first series of buckets has its greatest force and velocity. The force and velocity decrease as the steam passes inward. If the steam were passed from the center to the circumference, it is seen that by the time the
15 steam got near the circumference the wheel would be traveling there faster than the steam. By reversing it, as in my turbine, although the force and velocity of the steam decrease as it moves toward the center, still
20 the relative velocity of the buckets decreases as the steam passes from one series to the other toward the center. Thus the steam will have a decided effect on each series of buckets as it passes inward, and thus assist in rotating the wheel. There should be enough series that nearly all the force of the steam would be employed before it reached the exhaust-pipe. By this construction it is readily
25 seen that I utilize all the power in the steam, and that I have practically a number of turbines one within the other, all driven by one injection of steam, and that by such construction I am enabled, in order to get a certain
30 amount of power, to reduce the size of my ma-

chine to exceedingly-small dimensions, which 35 is a virtue that is meritorious in a great many ways in which steam-motors may be used, and especially in electric-headlight plants.

While I do not wish to limit myself to the specific form herein shown, I claim as my invention, and desire to secure by Letters Patent, the following: 40

In a steam turbine, the combination of a shaft, a wheel mounted thereon, concentric series of buckets on the wheel, the buckets 45 increasing in width in the successive series from circumference to center, a casing opposite to the wheel, deflectors extending from the casing into the annular spaces between the successive series of buckets, said deflectors also increasing in width from circumference to center, rings each connecting the outer ends of one series of buckets, and rings each connecting the outer ends of one series 50 of deflectors, said casing and wheel having concentric annular grooves for the reception of the rings of the buckets and deflectors respectively, an exhaust port near the center, and a steam chamber at the circumference, said steam chamber opening onto the outer series of buckets through a contracted port, 60 substantially as described.

In witness whereof I have hereunto set my hand this 22d day of September, 1894.

GEORGE C. PYLE.

Witnesses:

V. H. LOCKWOOD,
LELA MONROE.