Aug. 12, 1924. 1,504,520

L. H. SEIDEL

TURBINE WHEEL

Filed April 3, 1922 3 Sheets-Sheet 1

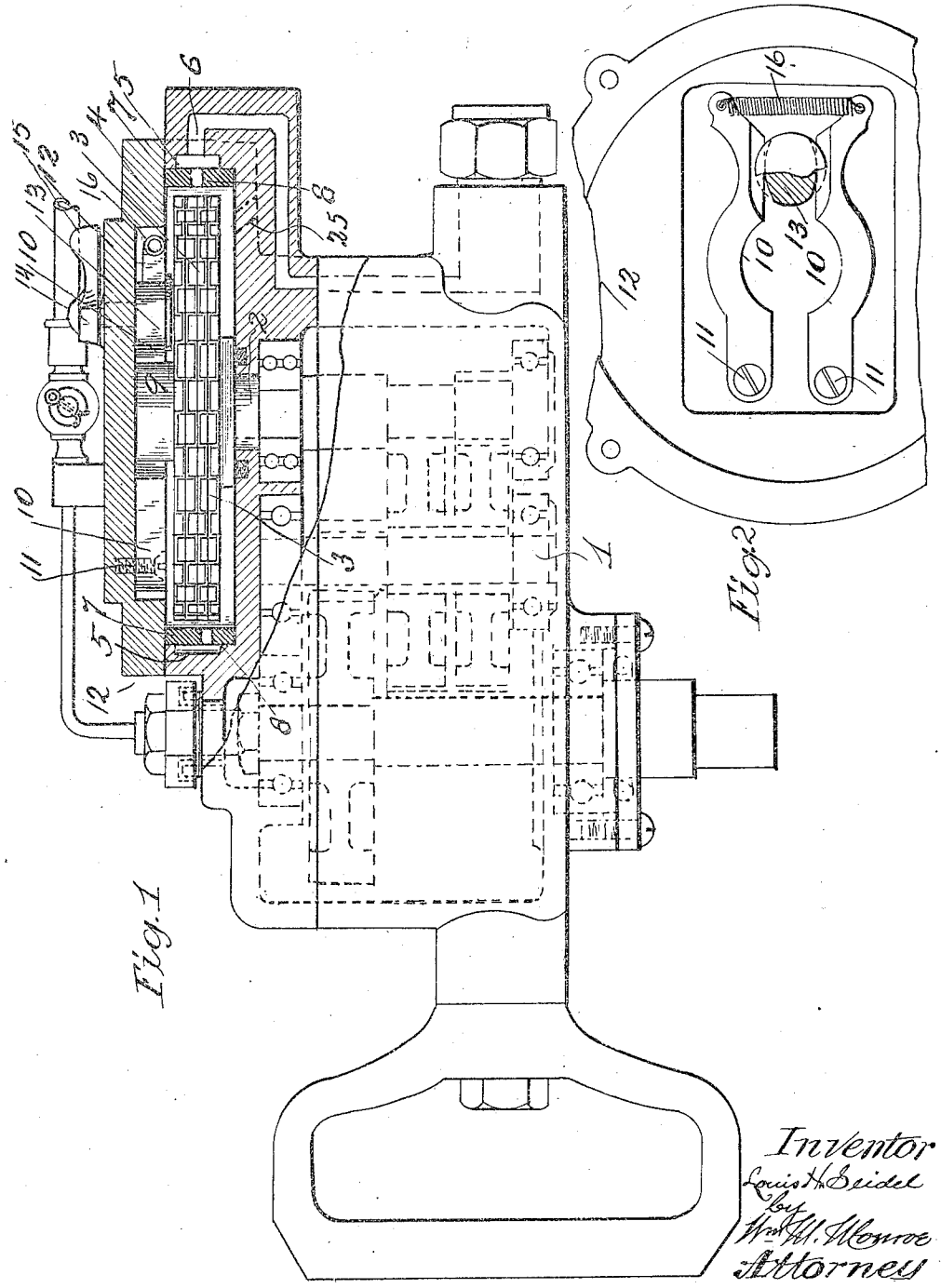


Fig. 1

Fig. 2

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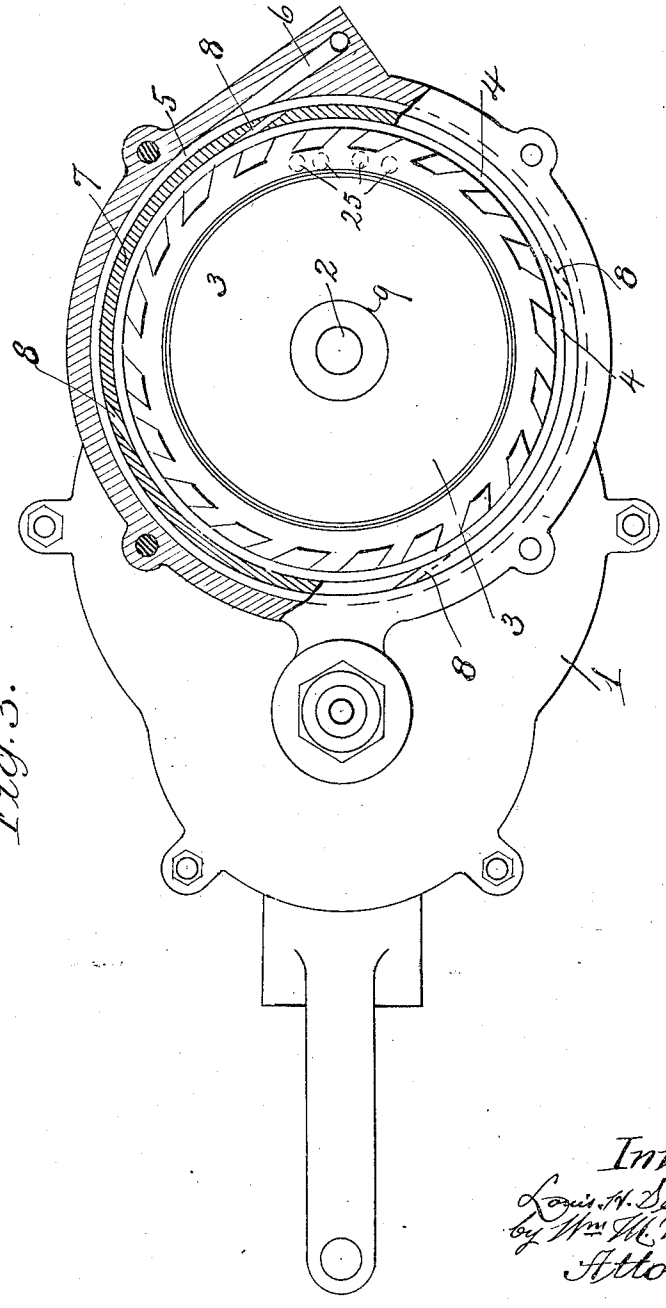


Fig. 3.

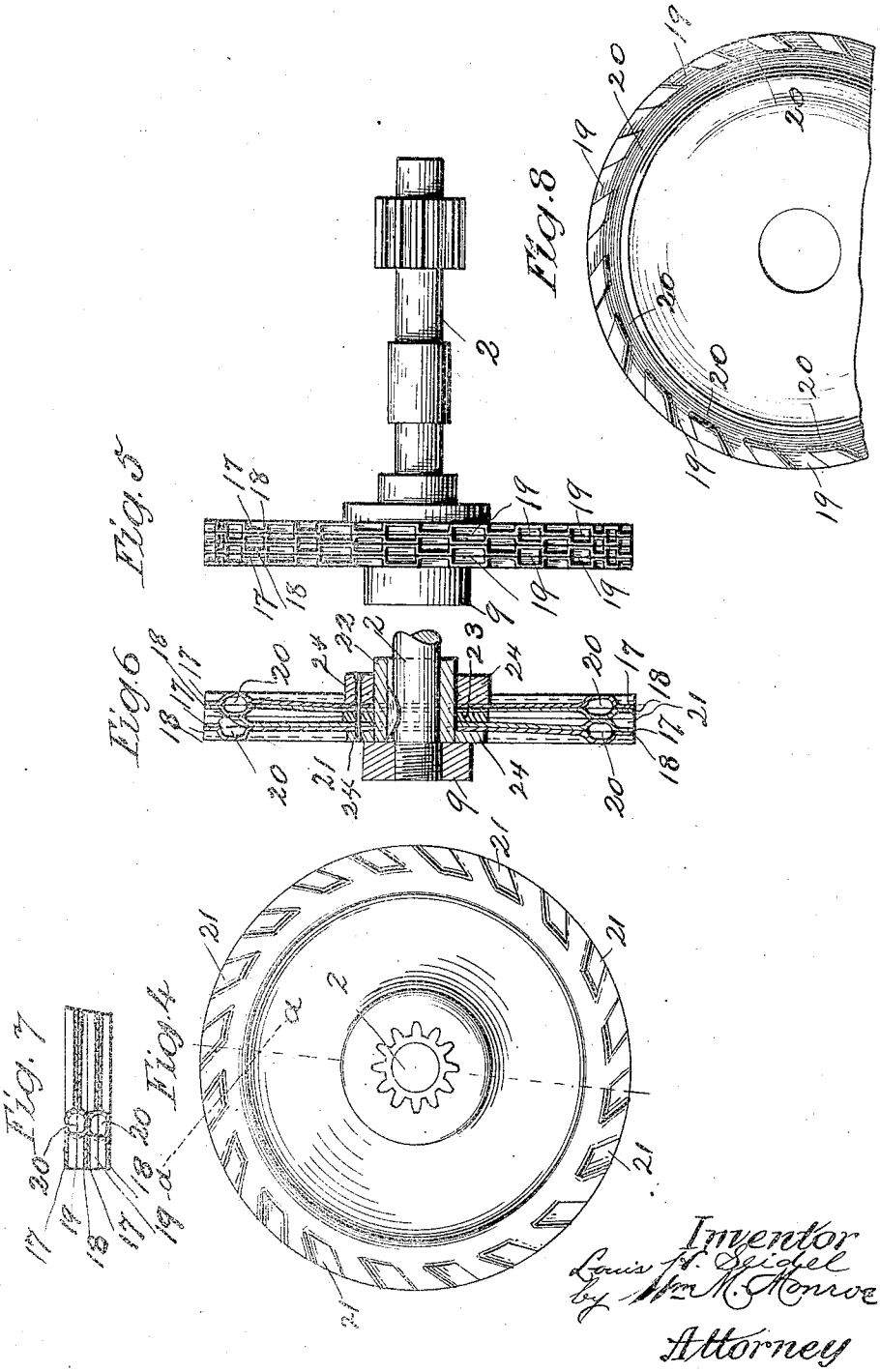
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UNITED STATES PATENT OFFICE.

LOUIS H. SEIDEL, OF LAKEWOOD, OHIO.

TURBINE WHEEL.

Application filed April 3, 1922. Serial No. 549,114.

To all whom it may concern:

Be it known that I, LOUIS H. SEIDEL, a citizen of the United States, and resident of Lakewood, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Turbine Wheels, of which I hereby declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

The objects of the invention are to provide an improved turbine of the impulse or impact type, for air or other fluids under pressure in which provision is made for the release of the propelling fluid, after it has exhausted its force upon the buckets thus greatly increasing the speed of revolution of the turbine wheel or rotor and thereby increasing the actual amount of power obtained from its movement.

This construction also enables the turbine wheel to acquire full speed immediately from a full stop, thus making its efficiency much greater. It is also supplied with brake means by means of which it can be instantly stopped.

The device is also formed from plates or laminations of sheet metal, applied together back to back, and each plate having bucket portions formed therein, so that when a number of such plates are assembled together, complete buckets will be formed between their engaging faces.

The invention includes an annular air duct formed in the adjacent faces of the bucket bearing plates and communicating with the inner ends of the buckets that are upon the same plane, thus affording a circulating means for the air after impinging upon the buckets, and permitting it to escape as soon as each bucket passes the pressure point.

The invention includes a multiple number of pairs of sheet metal discs, or sheet metal stampings each containing spaced and inclined depressions upon its face upon the outer edge forming halves of buckets therein, and containing an annular depression, communicating therewith, the inclination of the depression in the discs in each pair being reversed in stamping so that when similar sides of the discs are applied together, complete buckets will be formed between them, and a complete annular passage will also be formed between the applied faces of the disc which communicates with the inner ends of the buckets and also forms a means of communication between all the buckets in that plane. It indicates a turbine wheel composed of a plural number of pairs of such discs, applied together back to back and enclosing dead end buckets between them, which are positioned at the center of the wheel circumference and do not communicate with the annular passage aforesaid, but increase the amount of available active surface upon which the air jet impinges, and assist in utilizing the material without waste.

The invention includes an annular air passage or groove in the inner face of the casing adjacent to the turbine wheel, and a ring or wall tightly secured over said passage and provided with spaced and inclined jet openings arranged at different levels and adapted to discharge upon the buckets in the pair of discs which communicate with the annular passage therein, for the released air, and also to discharge upon the buckets intermediate of such pairs of discs, which lie in the center of the circumference of the wheel.

The invention also includes the employment of outlet passage for air leading through the bottom wall of the casing of the wheel adjacent to the buckets, through which the air entering the casing from the buckets that are not under pressure from jet nozzles escapes.

The invention is hereinafter more fully described and illustrated in the accompanying drawings, and specifically pointed out in the claims.

In the accompanying drawings Fig. 1 is a vertical section of a portable air driven tool in which the turbine is incorporated. Fig. 2 is a plan of the brake mechanism therefor; Fig. 3 is a plan of the tool with the cover of the turbine chamber removed; Fig. 4 is a bottom plan of the turbine wheel and shaft; Fig. 5 is a side elevation thereof; Fig. 6 is a vertical central section thereof, showing the intermediate closed buckets and annular air passages; Fig. 7 is a section on line *a*—*a*; Fig. 4 showing the buckets on each side of the center that communicate with the annular passages; Fig. 8 is a plan of one of the discs of the turbine wheel showing the inner face thereof and the portions of the buckets therein that communicate with the annular passage.

In Fig. 1, 1 is the gear case of the portable tool, 2 is the drive shaft, 3 is the turbine wheel mounted upon said shaft and furnishing the driving power therefor, 4 is the turbine chamber provided with the annular recess 5 into which an air passage 6 enters, which is supplied with air under pressure from any convenient source. A ring 7 tightly closes this passage and is provided with the spaced discharge nozzle openings 8, 8 inclined tangentially to the periphery of the turbine wheel 3 adjacent thereto. A nut 9, is attached to the upper extremity of the driving shaft, which is engaged by the braking arms, 10, 10 pivoted at their ends at 11, 11 upon the cover 12 of the turbine chamber and removable therewith. A cam 13 intermediate of these arms is operated by a shaft 14 and lever 15 upon the outer face of the cover to release the arms from contact with the nut, and a spring 16 engages them therewith. By this means the turbine wheel can be instantly released and instantly stopped when desired.

The construction of the turbine wheel is clearly shown in Figs. 4, 5, 6, 7, and 8.

Here in Fig. 7, 17, 17, and 18, 18, are disc-shaped sheet metal stampings arranged back to back in pairs, and reversely stamped and recessed to provide bucket openings, 19, between them.

The sheet metal, when stamped in this manner provides one-half of the bucket opening in each of the adjacent faces of the discs. All these bucket openings communicate with the common annular groove, 20, one-half of which is formed in each disc, and when the discs are closely approximated, the grooves provide a common air passage through which the air is able to flow when released from the buckets. Two pairs of these discs are shown, secured together back to back, in Fig. 7.

Alternating with these bucket openings and on the other side of each disc, are formed the halves of bucket recesses or openings, 21, and when two discs having these recesses, 21, are placed in contact with each other, the intermediate bucket openings are formed, as shown in Fig. 6, which do not communicate with the annular passages, 20.

The wheel built up in this manner from metal stampings is secured upon the sleeve, 22. A thin central washer, 23, is placed between the pairs of discs, and clamping washers, 24, are riveted or screwed upon each side of the plates, thus compressing them upon the washer, 23, and causing the discs to flare outwardly at their outer ends, thus making the contact perfect and air-tight, and the centrifugal force developed when the wheel is running full speed tends to make the discs hug each other more closely.

The jet openings or nozzles 8 in the ring wall 7 are vertically spaced so as to alternately discharge upon the upper and lower buckets 19 in the turbine wheel and to also continuously discharge upon the central or intermediate buckets 21 thus giving the greatest possible efficiency to the wheel.

The air after passing through the outside buckets 19 and annular passages 20 is released by passing through the communicating buckets, that are not actually under the pressure of the entering air, into the turbine chamber and out through the perforation 25 in the bottom wall of the chamber adjacent to the sides of the buckets.

The immediate release of the air from the side buckets prevents choking action of the air in the turbine casing, and also the inclination of the buckets permits reaction where the air issues therefrom that adds to the speed and efficiency of the wheel.

Having described the invention what I claim as new and desire to secure by Letters Patent is:

1. In a laminated turbine wheel, a metal stamping, comprising a disc having spaced and inclined alternate projections and recesses in its sides adjacent to its outer edge, and an annular groove in one side communicating with the recesses in that side.

2. In a laminated turbine wheel, a multiple number of discs, each comprising a metal stamping, each disc having alternate inclined recesses and projections in its sides adjacent to its outer edge and with an annular groove in one side communicating with the recesses on that side, said discs secured together back to back, and providing, when assembled, parallel rows of peripheral staggered bucket openings communicating with said grooves, and said grooves forming internal air circulating passages in said wheel.

3. In a laminated turbine wheel, a multiple number of discs, each comprising a metal stamping, each disc having alternate inclined recesses and projections in its sides adjacent to its outer edge and with an annular groove in one side communicating with the recesses on that side, said discs secured together back to back, and providing, when assembled, parallel rows of peripheral staggered bucket openings communicating with said grooves, and said grooves forming internal air circulating passages in said wheel, and also providing an intermediate row of inclined bucket openings that do not communicate with said annular grooves or passages.

4. In a laminated sheet metal turbine wheel, a pair of metal discs secured together back to back, and a common sleeve or hub therefor each disc provided with spaced recesses adjacent to its outer edge, the recesses in the adjoining disc being opposed

to each other and forming common bucket openings in the periphery of said wheel.

5. A laminated sheet metal turbine wheel comprising pairs of metal discs secured together back to back, each disc provided with spaced recesses adjacent to its outer edge, the recesses in the discs of each pair being opposed to each other, and forming common bucket openings.

6. The combination with spaced pairs of metal stamped discs, said discs having complementary bucket openings stamped in their marginal edges, of a washer between said pairs of discs, a common shaft therefor, and clamping means for securing said discs and washer together.

7. The combination with two pairs of discs, placed back to back, said discs provided with alternate projections and recesses on their outer edges, forming complementary bucket openings therein, said complementary openings forming complete openings when said discs are brought face to face with each other, a common shaft for said discs, a thin washer between said pairs of discs, and means for clamping said discs and washers together, said clamping means serving to draw the central parts of said discs nearer together.

In testimony whereof, I hereunto set my hand this 22'' day of Mch. 1922.

LOUIS H. SEIDEL.

In presence of—
WM. M. MUNROE,
CHAS. F. SIPE.