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TURBINE.

APPLICATION FILED JAN. 25, 1911.

1,005,294.

Patented Oct. 10, 1911.

5 SHEETS—SHEET 1.

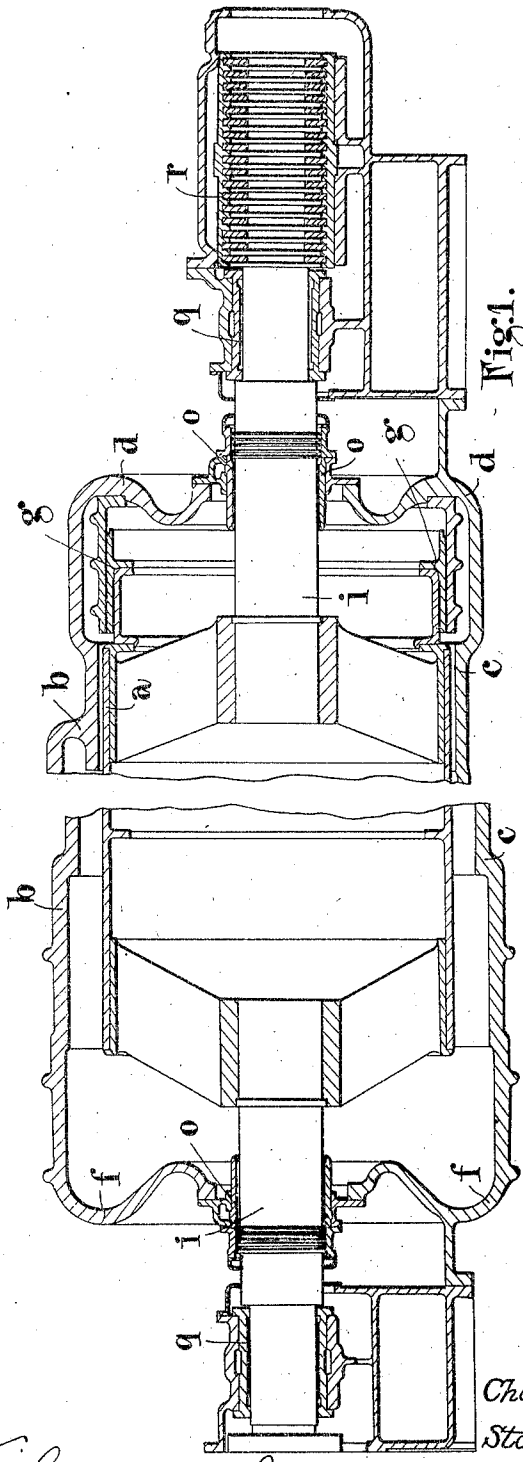

Fig. 1.

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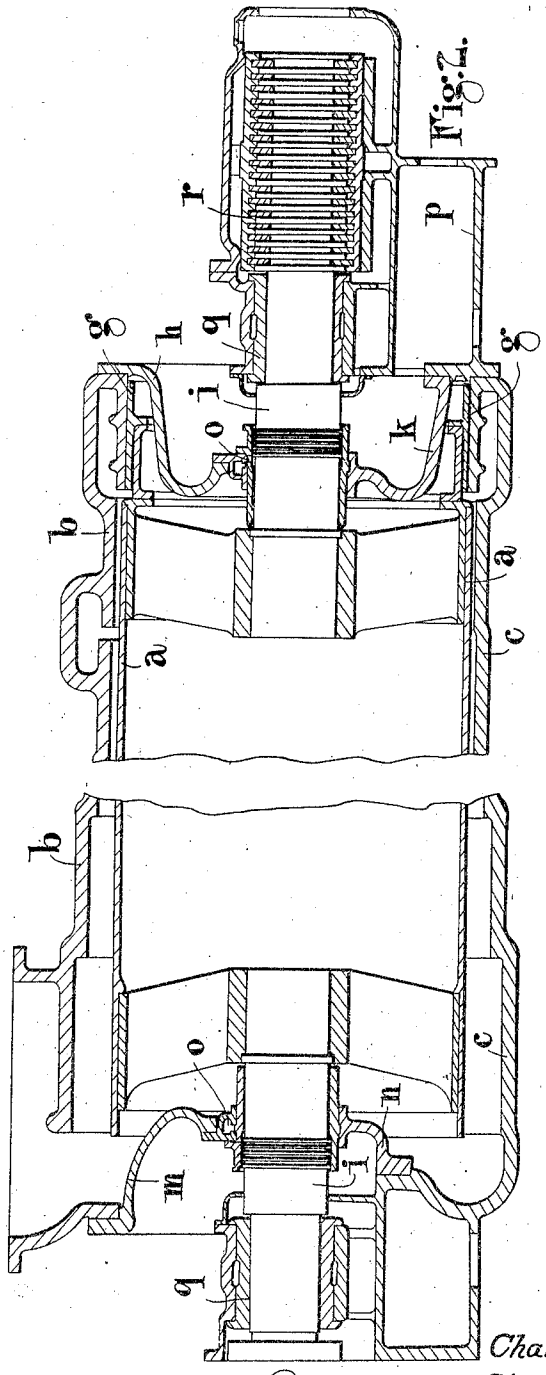
Fig. 2.



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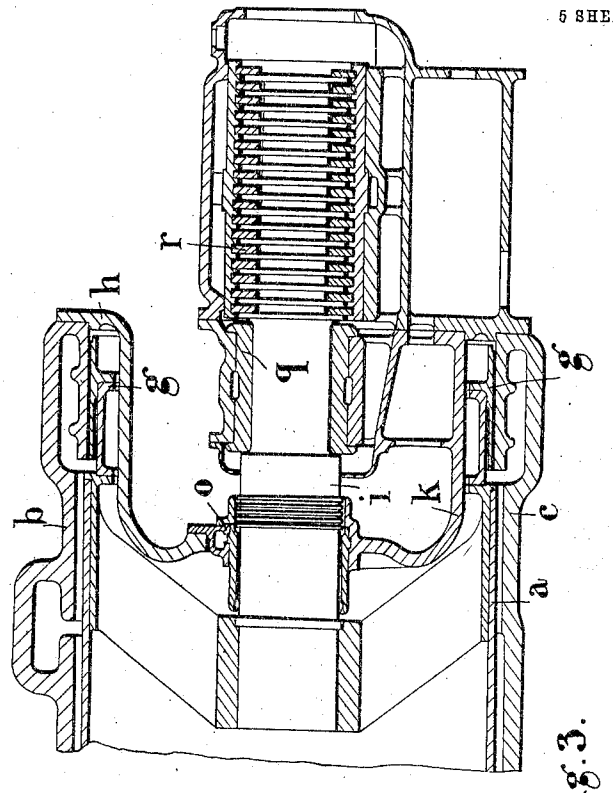
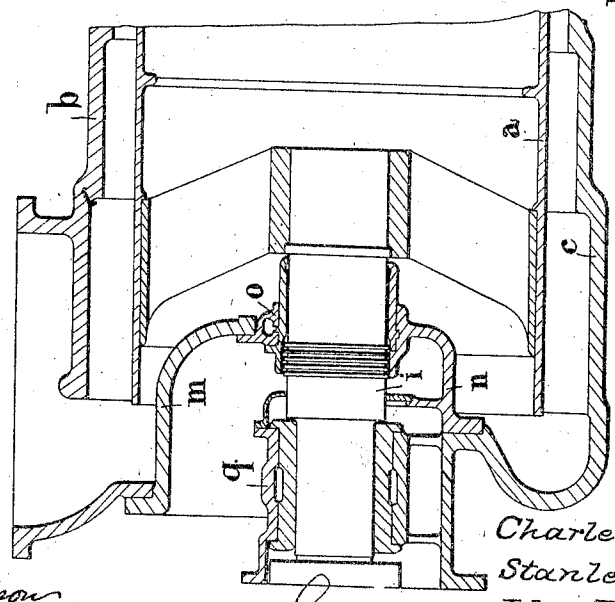


Fig. 3.



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5 SHEETS—SHEET 4.

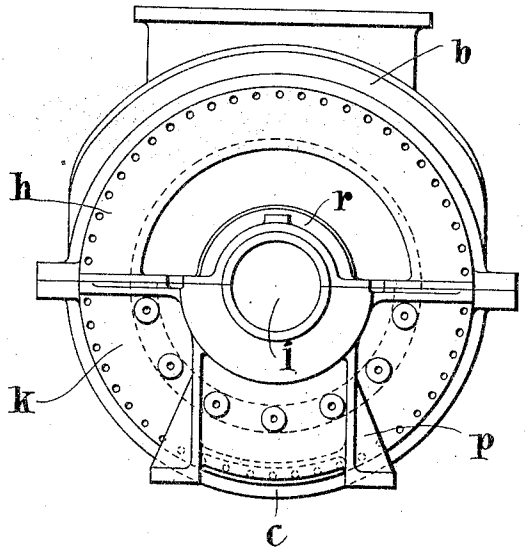

Fig. 4

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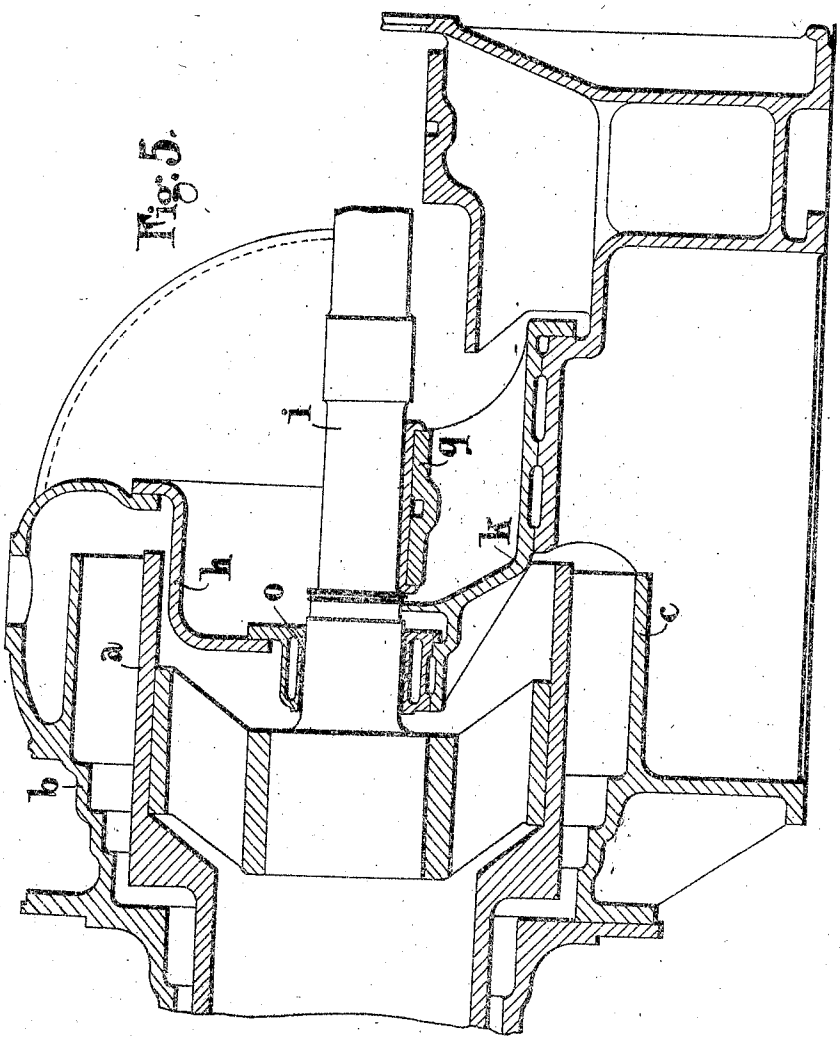
5 SHEETS—SHEET 5.

Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES ALGERNON PARSONS, OF NEWCASTLE-UPON-TYNE, AND STANLEY SMITH COOK AND JOHN TURNBULL, OF WALLSEND, ENGLAND; SAID COOK AND TURNBULL ASSIGNORS TO SAID PARSONS.

TURBINE.

1,005,294. Specification of Letters Patent. Patented Oct. 10, 1911.

Application filed January 25, 1911. Serial No. 604,641.

To all whom it may concern:

Be it known that we, CHARLES ALGERNON PARSONS, C. B., a subject of the King of Great Britain and Ireland, and residing at Heaton Works, Newcastle-upon-Tyne, in the county of Northumberland, England, and STANLEY SMITH COOK and JOHN TURNBULL, subjects of the King of Great Britain and Ireland, both residing at Turbinia Works, Wallsend-on-Tyne, in the county of Northumberland, England, have invented certain new and useful Improvements in and Relating to Turbines, of which the following is a specification.

This invention relates to the casings for turbine rotors and the like.

In such casings as have hitherto been proposed, the casing ends are permanently attached to or form part of the casing body. This necessitates that in order to pass the rotor in and out of its working position to a position clear of the cylinder body, the internal surfaces of said casing ends which are at a less distance from the central axis of the turbine than the extreme projecting parts of the rotor body must be placed laterally farther outboard than the said projecting parts thereby increasing the length of the turbine.

The object of the present invention is to provide a construction of turbine casing by which the length and the weight of the turbine is reduced.

The invention consists for this purpose in making the ends or portions of the ends of the turbine casing detachable from the body of the casing, and of such a form that they project axially within the above mentioned projections of the rotor, the detachability of the casing ends or part thereof allowing the rotor to be removed from its normal position within the casing.

The invention also consists in the forms of turbine casings hereinafter described.

Referring now to the accompanying drawings, Figure 1 shows a turbine having a casing of ordinary construction. Fig. 2 shows a turbine in which the casing is formed according to the present invention. Fig. 3 shows a modified construction of turbine casing according to the present invention, Fig. 4 is an end elevation of the right hand end of the turbine shown in Fig. 3, and Fig. 5 shows the casing end of a land turbine.

In the already known form of turbine casing, such as that shown for example in Fig. 1, the turbine rotor, *a*, is inclosed by a casing which consists of an upper and a lower part, *b* and *c*, respectively, connected together by a suitable joint in the central horizontal plane of the rotor, the casing ends, *d* and *f* being formed in two parts integral with or permanently attached to the top and lower parts, *b* and *c*, respectively.

It will be seen that after the top part, *b*, of the casing has been removed, sufficient clearance space in an axial direction must be left between the end of the rotor, *a*, or in the case illustrated of the dummy piston *g*, and the innermost surface of the lower half of the casing end, *d*. As already pointed out, this necessitates that the casing ends extend axially some distance outside the extreme projecting parts of the rotor and consequently such a casing adds considerably to the overall length of the turbine. According to the present invention however, as applied for instance to the turbine shown in Fig. 2, the cylindrical part of the turbine casing, as before, is formed in two parts, *b* and *c*, suitably connected, generally by a horizontal joint, but the casing ends are formed in two or more parts, *h*, *k*, and *m*, *n*, respectively which are entirely separate from the cylindrical parts, *b*, *c*.

Each complete casing end is formed with a dished or like shaped part so that this part extends axially within the extreme projecting ends of the turbine rotor, *a*, and dummy piston, *g*. The dish or like shaped cavity thus available in the casing ends can be utilized by placing therein the turbine glands, *o*, which prevent leakage of steam between the rotor shaft, *i*, and the casing ends.

The upper part, *h*, of the casing end is generally bolted to the corresponding cylindrical part, *b*, while the lower part, *k*, is bolted to a casting, *p*, which carries the bearings, *q*, and thrust block, *r*, of the turbine. Consequently, the bearings and block can now be placed nearer the turbine rotor and in fact partly within the same, thus decreasing the overall length and the weight of the turbine.

In the modified construction of the casing shown in Figs. 3 and 4, the dish or like shaped ends, *h*, *k*, and *m*, *n*, extend axially within the dummy piston, *g*, and rotor, *a*, at each end of the turbine and, as before, carry

the gland packings for the rotor shaft, *i*, but extend so far axially within the rotor as to provide space enough to contain the rotor shaft bearings, *q*, which can now be formed integral with or attached to the lower part, *k*, of the casing end. A separate casting bolted to the end casing and bearing casting now carries the thrust block, *r*, and if the latter is dispensed with, as in the case of land installations, it will be seen that the turbine and its bearings are now included within a length substantially equal to that of the turbine rotor, *a*.

In Fig. 5 one end of the casing of a land turbine is shown, the reduction in length of the turbine and its bearing being apparent from the description of the other forms which have similar reference letters.

In removing the turbine rotor from such casings we first remove the top covers from the bearings and block and then detach the upper part, *h* and *m*, of each of the casing ends and detach the lower end part, *k*, and *n*, from the main casing, *c*, and bearings, *q*, if attached to the latter, and then rotate the lower end part, *k*, and *n*, around the rotor shaft, *i*, until the part can be removed through the space caused by the removal of the upper end parts, *h* and *m*. The upper part, *b*, of the cylindrical part of the casing is then removed in the usual manner and the rotor, *a*, can then be removed. The rotor may also be taken out of the casing by simply removing the top cylindrical part, *b*, of the latter and detaching the casing ends from the lower parts, *c*, of the casing when the rotor, *a*, and casing ends, and in some cases the bearings, can then be lifted out bodily.

It has been shown that the object of this invention has been accomplished without in any way interfering with the accessibility of any of the turbine parts.

It will be seen that such a turbine casing can be used to incase the rotor of any type of turbine or combined reversing and ahead turbine and that many modifications can be made in the manner of carrying this invention into effect without in any way departing from the spirit of the same.

Having now described our invention what we claim as new and desire to secure by Letters Patent is:—

1. A turbine comprising in combination a rotor contained within a casing, bearing means for the rotor and means supporting the bearing means, casing ends which are detachable from the casing and project axially within the turbine rotor, said detachable ends being made in several parts thereby allowing the rotor to be removed from its normal position within the casing without interfering with the bearing supporting means.

2. A turbine comprising in combination a rotor contained within a casing, bearing means for the rotor and means supporting the bearing means, said bearing supporting means being formed integral with the casing, casing ends which are detachable from the casing and project axially within the turbine rotor, said detachable ends being made in several parts thereby allowing the rotor to be removed from its normal position within the casing without interfering with the bearing supporting means.

3. A turbine comprising in combination a rotor contained within a casing, bearing means for the rotor, and means supporting the bearing means, casing ends which are detachable from the casing and project axially within the turbine rotor, a packing carried by each of the casing ends at the place where the shaft passes therethrough, said detachable ends being made in several parts thereby allowing the rotor to be removed from its normal position within the casing without interfering with the bearing supporting means.

4. A turbine comprising in combination a rotor contained within a casing, bearing means for the rotor, and means supporting the bearing means, said bearing supporting means being formed integral with the casing ends which are detachable from the casing and project axially within the turbine rotor, a packing gland carried by each of the casing ends at the place where the shaft passes therethrough, said detachable ends being made in several parts thereby allowing the rotor to be removed from its normal position within the casing without interfering with the bearing supporting means.

5. A turbine comprising in combination a rotor contained within a casing, bearing means for the rotor and means supporting the bearing means, casing ends which are detachable from the casing and project axially within the turbine rotor, said detachable ends being made in several parts, while the bearing supporting means are at one end of the rotor formed integral with the casing, and at the other end attached to a part of a detachable casing end.

6. A turbine having a rotor, a shaft on which said rotor is mounted, and a casing containing the rotor, detachable ends on said casing projecting axially and radially within the turbine rotor, a packing gland carried by said casing ends at the place where the shaft passes therethrough, said ends being made in several parts, bearings for the rotor shaft which are at one end of the shaft formed integral with the rotor casing, and at the other end attached to a part of the detachable casing end.

7. A turbine having a rotor, a shaft on which said rotor is mounted, and a casing containing the rotor, detachable ends for said casing, each end being made in several parts and formed so as to project radially

as well as axially within the turbine rotor, a bearing at one end of the rotor shaft formed integral with the casing, the casing itself being also attached to the bearing and a bearing at the other end of the shaft carried by the detachable end.

8. A turbine having a rotor, a shaft on which said rotor is mounted, and a casing containing the rotor, detachable ends for said casing, each end being made in several parts and formed so as to project radially as well as axially within the turbine rotor, a bearing at one end of the rotor shaft formed integral with the casing, the casing end itself being also attached to the bearing and a bearing at the other end of the shaft carried by the detachable end, and a thrust block attached to the main casing and one of the detachable ends.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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JOHN TURNBULL.

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