

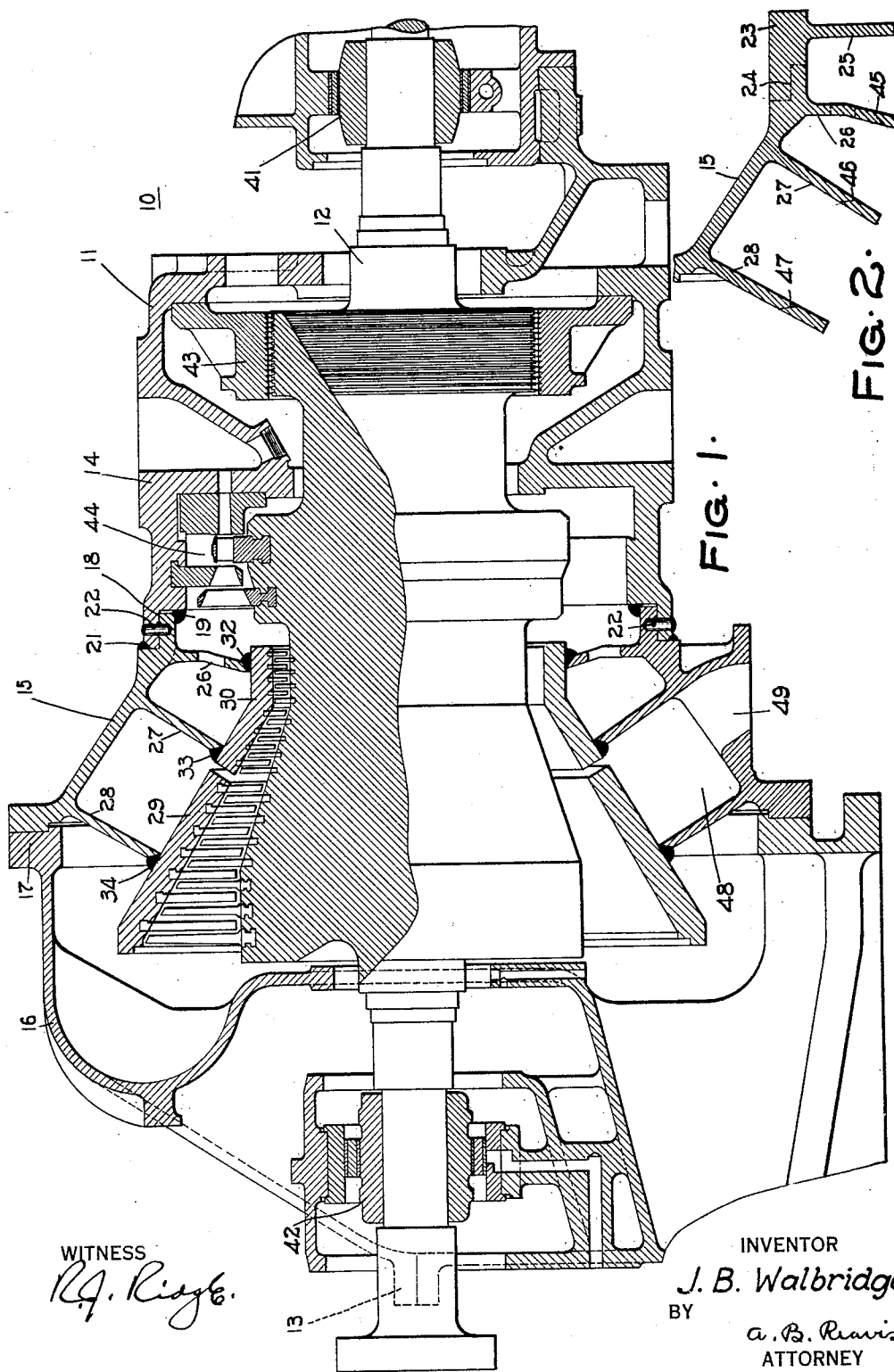
Oct. 25, 1932.

J. B. WALBRIDGE

1,884,422

TURBINE CASING

Filed June 7, 1930



UNITED STATES PATENT OFFICE

JOHN B. WALBRIDGE, OF DREXEL HILL, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA

TURBINE CASING

Application filed June 7, 1930. Serial No. 459,802.

My invention relates to a construction of turbine stator, and it has for its object to provide a construction enabling simpler manufacturing methods.

5 The conditions under which steam turbines are to operate vary to such an extent that a manufacturer cannot usually supply turbines from stock, except very small turbines, but must construct each turbine in accordance with its operating conditions. This means that patterns must be made and the complete manufacturing operation must be carried out after an order for a turbine is received.

10 It is an object of my invention to provide a construction of turbine stator which comprises standardized parts from which a turbine may be constructed for various operating conditions, so that the parts may be carried in stock and readily assembled into a turbine.

A more particular object is to provide a construction of the character set forth involving a minimum number of parts of which a turbine stator is constructed.

15 In accordance with my invention, I provide a casting which includes a part of the turbine casing and one or more integral webs, for supporting the blade carrying member, each web being of a dimension equal to the maximum dimension which may be required in the turbine. The blade carrying members are of a regular form, and are also of the maximum axial length which may be required. In constructing a turbine from said parts, the blade carrying member is cut to the required size, if necessary. The webs are also cut to the proper dimensions, so that the inner edge meets the main body of the blade carrying member with the latter in the desired axial position in the turbine. Said edge is then welded to the main body of the blade carrying member.

20 The above and other objects are effected by my invention, as will be apparent from the following description and claims taken in connection with the accompanying drawing, forming a part of this application, in which:

50 Fig. 1 is a longitudinal, sectional view

through a turbine constructed in accordance with the present invention; and,

Fig. 2 is a detail sectional view showing the form of the casting as carried in stock.

Referring now to the drawing more in detail, I show an elastic fluid turbine 10 comprising a casing 11 and a rotor 12. The casing 11 is divided along the horizontal plane of the turbine axis, and the upper and lower parts are formed with flanges 13 at the meeting plane by means of which said parts may be secured together.

The casing 11 is also divided longitudinally into three sections 14, 15 and 16. The section 16 provides the exhaust chamber and is secured to the section 15 by a conventional flange and bolt joint 17. The sections 14 and 15 are connected by a telescopic joint 18. The sections are also welded to each other at 19 and 21, and a number of radially-extending, circumferentially-distributed pins 22 extend through the telescopic parts to fix the relative position of the sections 14 and 15 and to transmit longitudinal and circumferential thrusts. The purpose of the telescoping type of joint is to permit a variation in the length of the casing, as hereinafter explained.

The section 15 is formed with integral webs 26, 27 and 28, extending inwardly in a direction which is at least partly radial. The webs support blade-carrying members 29 and 30, which are secured to the webs by welding the inner edges of the webs to the main body of the blade-carrying members, as indicated at 32, 33 and 34.

The blade-carrying members are of tubular form, extending in a direction one component of which is axial, and they each carry a plurality of annular rows of stationary blades. The blade-carrying members are preferably of relatively regular form, that is, they do not have projections for fitting the blade-carrying members; so that they may be secured at any axial point thereof to the webs, and disposed in any one of various axial positions.

The section 15 is cast and carried in stock in the form shown in Fig. 2; an additional web 25 being provided at the end 23 at which

the joint 18 is formed, and the axial length of the section and the dimensions of the webs being the maximum required in the range of steam conditions for which the casting may be required. The blade-carrying members are also formed and carried in stock in their maximum axial length.

In constructing a turbine for the particular steam conditions required, the blade-carrying members are reduced to the correct axial length, if such is less than the original maximum length. The axial position of the blade-carrying members relative to the webs supporting the same is determined and the webs are cut at the points at which they meet the main body of the blade-carrying members, and are then welded thereto. It will be apparent that a substantial variation is provided in the axial position in which the blade-carrying members may be disposed relative to the casing.

For the turbine shown in Fig. 1, the end 23 is cut at 24, removing the web 25. The webs 26, 27 and 28 are cut at 45, 46, and 47, respectively.

The remainder of the turbine may be of any suitable construction, such as shown on the drawing, in which the rotor is supported in bearings 41 and 42, and in which the section 11 carries dummy rings 43 and the stationary blades and nozzles of an impulse stage 44. The chamber 48 formed between the webs 27 and 28 and an outlet 49 communicating therewith may be used for extraction of partially expanded motive fluid.

To cover a wide range of steam conditions, a number of different sizes of castings of the section 15 are provided, and each of these sizes is adapted for different operating conditions within a limited portion of the total range. Different diameters of the sections 14 and 16 which fit the different sizes of the sections 15 are provided. Each size of the section 15 will provide for a sufficient range of different operating conditions so that a reasonable number thereof may be carried in stock.

From the above description, it will be seen that I have provided a turbine stator construction which involves relatively few parts which may be standardized, and that the turbine stator may readily be constructed from said standardized parts. It will be apparent that by this construction it is possible to deliver a turbine suited for any desired conditions in a much shorter period of time than heretofore.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire therefore, that only such limitations shall be placed thereupon as are

imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:—

1. The method of assembling and constructing a turbine stator of desired capacity from standardized parts including a tubular portion made of cast metal having an integral approximately radial web portion and a separate tubular blade-carrying member, which comprises cutting the inner edge of the web portion to a diameter fitting the exterior of a tubular blade-carrying member of a size providing the desired capacity, positioning the blade-carrying member in the web portion in the desired axial position relative thereto, and welding the inner edge of the web portion to the main body of the blade-carrying member.

2. The method of manufacturing a turbine stator of desired capacity, the stator comprising intermediate and end sections for connection together in end-to-end relation and the intermediate section having inwardly extending webs connected to blade rings, which comprises cutting the intermediate section to suitable length, cutting the webs to define openings of desired diameters, placing a blade ring or rings of desired size in the openings, welding the blade ring or rings to the webs, and securing the intermediate section to the end sections.

In testimony whereof, I have hereunto subscribed my name this 5th day of June, 1930.

JOHN B. WALBRIDGE.