March 9, 1937. G. BELLUZZO 2,073,191

COMBUSTION TURBINE

Filed March 29, 1935 4 Sheets-Sheet 1

Fig. 1

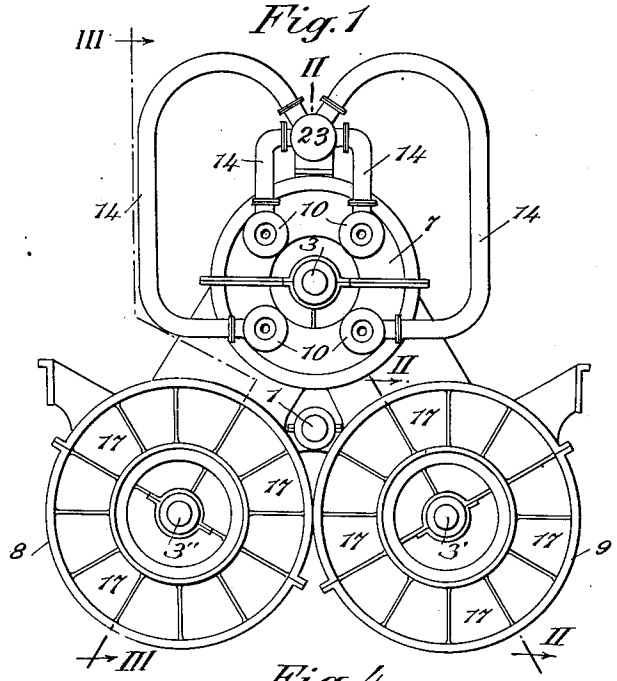
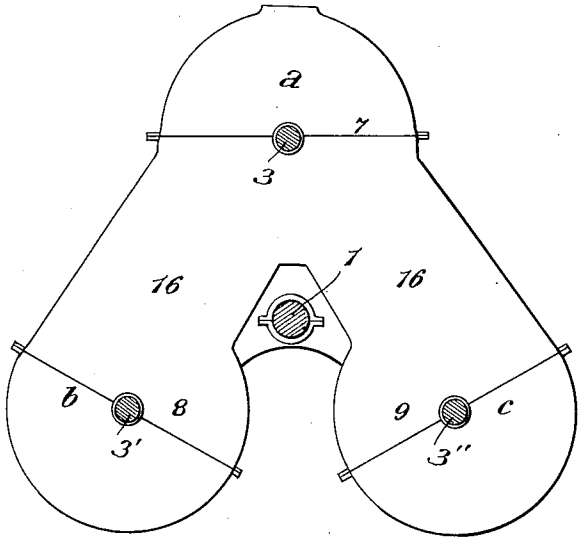


Fig. 4



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Filed March 29, 1935 4 Sheets-Sheet 2

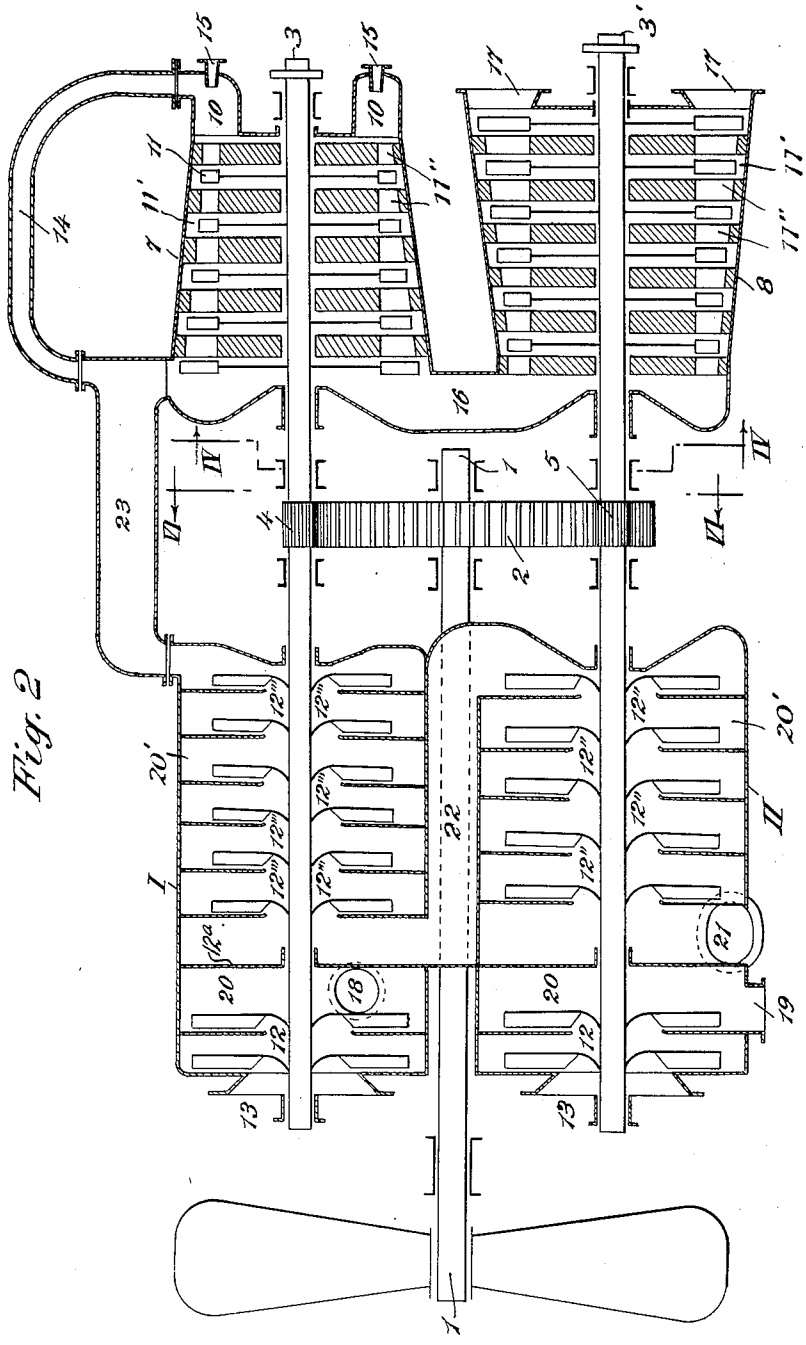

Fig. 2

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COMBUSTION TURBINE

Filed March 29, 1935 4 Sheets-Sheet 3

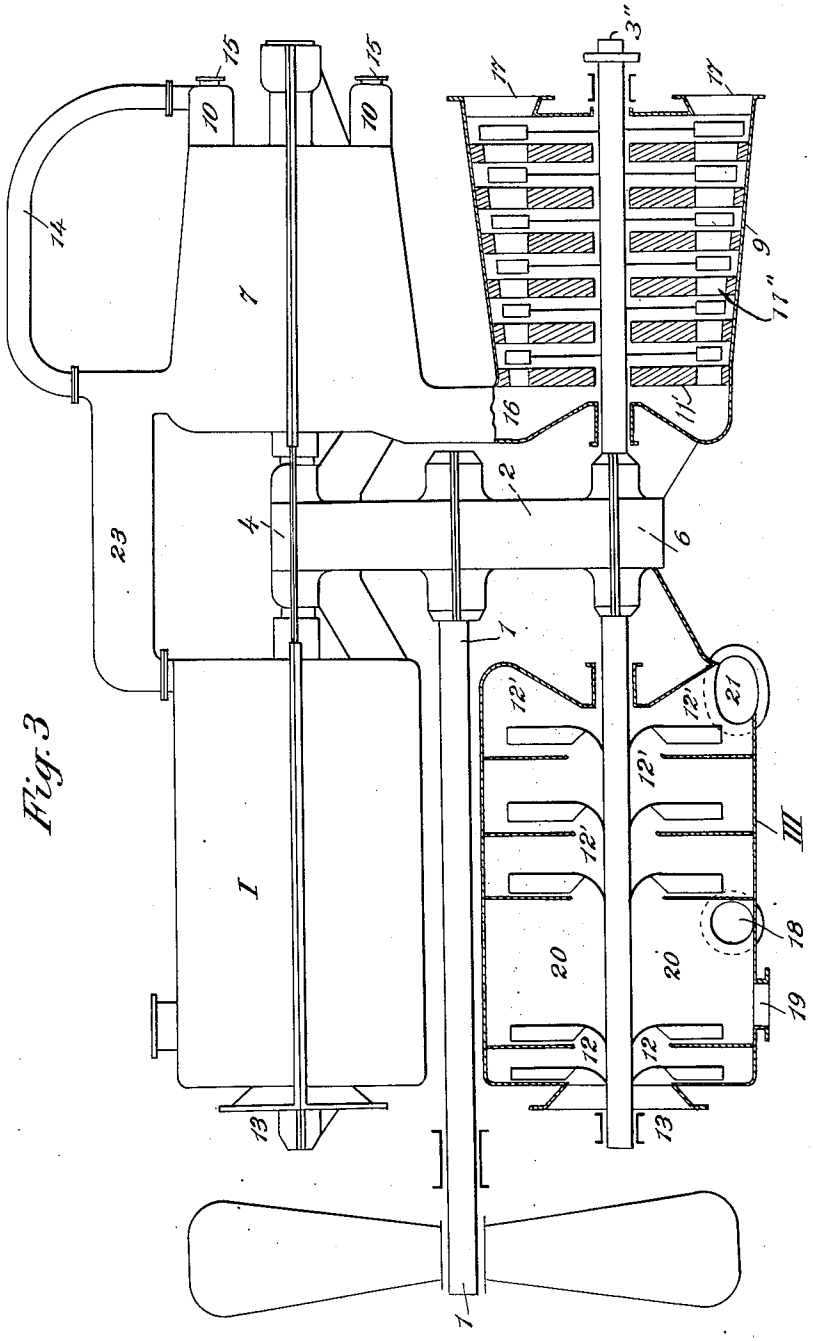

Fig. 3

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March 9, 1937. G. BELLUZZO 2,073,191

COMBUSTION TURBINE

Filed March 29, 1935 4 Sheets-Sheet 4

Fig. 5

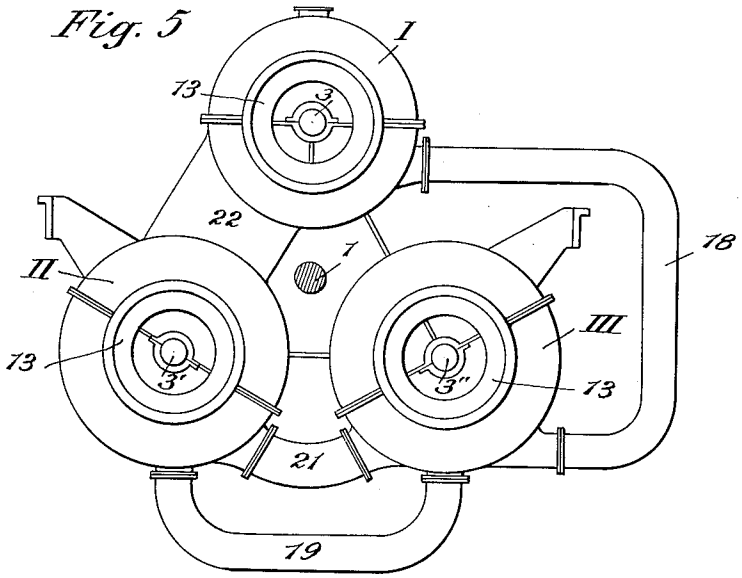
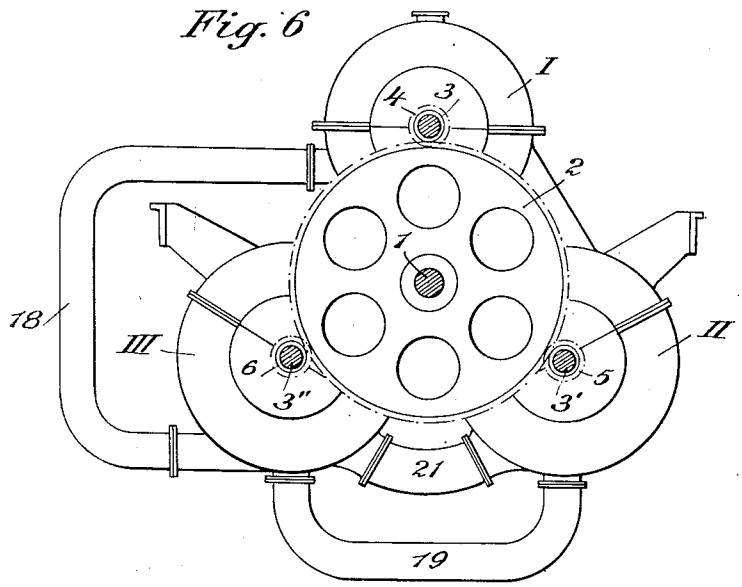


Fig. 6



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UNITED STATES PATENT OFFICE

2,073,191

COMBUSTION TURBINE

Giuseppe Belluzzo, Rome, Italy

Application March 29, 1935, Serial No. 13,774
In Italy February 13, 1935

2 Claims. (Cl. 60—41)

My invention relates to improvements in turbines of the internal combustion type.

The principal object of my invention is to provide a turbine embodying greater efficiency than turbines as commonly constructed and of compact arrangement so that it will occupy a small amount of space.

Another object is to provide in a turbine a novel arrangement of turbine units, air compressors, and a power transmitting shaft, whereby each unit drives an air compressor directly and all of said units conjointly drive the power transmitting shaft.

Other and subordinate objects will presently appear when the following description and claims are read with reference to the accompanying drawings.

In said drawings;

Figure 1 is an end elevation of a turbine constructed according to my invention,

Figure 2 is a vertical longitudinal section taken on the line II—II of Fig. 1 looking in the direction indicated by the arrows,

Figure 3 is a view partly in longitudinal section and partly in elevation, the sectional portion of this view being taken on the line III—III of Fig. 1 looking in the direction indicated by the arrows,

Figure 4 is a view in transverse section taken on the line IV—IV of Fig. 2 looking in the direction of the arrows,

Figure 5 is a view in end elevation, of the other end of the turbine, parts being shown in section, and

Figure 6 is a view partly in section and partly in elevation taken on the line VI—VI of Fig. 2.

Referring to the drawings by numerals my improved turbine comprises as its essential components, a power transmitting drive, or propeller, shaft 1, having fast thereon a driven gear 2, a plurality of turbine units, preferably three in number designated 7, 8 and 9, a like number of centrifugal air compressors I, II and III each related to one of the turbine units and disposed coaxially thereof, common rotor shafts for related turbine units and air compressors, designated 3, 3', 3'', and reduction gears 4, 5, and 6 fast on said shafts 3, 3', 3'' respectively and meshing with the driven gear 2. The turbine units 7, 8, and 9 and compressors I, II and III are grouped equidistantly about the shaft 1 for operation about axis parallel with the axis of the said shaft 1.

One of the turbine units, preferably the uppermost one 7, as shown in the drawings, is a high pressure turbine, the other two 8 and 9 being low pressure turbines. The rotors 11 of the turbines may be of any suitable construction preferably similar to those disclosed in U. S. Patent No. 1,651,503. Suitable partitions 11' provided with distributing openings 11'' separate the rotors for a purpose which will be understood.

Each compressor I, II, III comprises two groups of blades fast on the related rotor shaft 3, 3', 3'' as the case may be. One group of rotor blades 12 in each instance is located at the forward end of the compressor. They function to suck air into chambers 20 through inlet openings 13 in the forward ends of said compressors. In the case of the compressor I related to the high pressure turbine 7 and one of the other compressors, in this instance II the chambers 20 are separate compression chambers in front of a second compression chamber 20', the two compression chambers of each compressor I, II, being separated by a partition 12a, as shown in Fig. 2. In the case of the compressor III there is only one compression chamber 20. Each compressor I, II and III includes a second group of rotor blades designated 12''', 12'' and 12', respectively, those of the two chamber compressors I and II rotating in the chamber 20' and those of compressor III rotating in the chamber 20. The rotor blades may be of the type disclosed in U. S. Patent No. 1,657,192.

The air compressed by the groups of blades 12 of the compressors I and II enter the chamber 20 of compressor III by way of conduits 10 and 19. In this latter chamber the air is sucked and successively compressed by the blades 12 and 12' of the compressor III. From the compressor III the air passes through a conduit 21 to the chamber 20' and blades 12'' of compressor II and from thence through a conduit 22 to the chamber 20' and blades 12''' of compressor I. From the chamber 20' of compressor I the air passes into a chamber 23 and from thence by piping 14 into a plurality of combustion chambers 10 provided at one end of the high pressure turbine unit 7 and communicating with corresponding distributing openings 11'' in one of the partitions 11' leading to one end rotor 11 of said unit. The end walls a, b, and c of the turbine units 7, 8, and 9 opposite the compressors I, II, and III form conduits 16 by means of which the high pressure turbine 7 discharges or exhausts into the low pressure turbines 8 and 9. The gearing 2, 3, 4 and 5 is housed between the compressors I, II, III and the turbine units 7, 8 and 9. The low pressure turbines are provided with

discharge apertures 17 at their ends opposite the conduits 16.

As will be understood the compressor I is a high compression unit particularly as regards the blades 12''' and the compressors II and III low compression units. Each compressor has a group of blades 12 which may be said to function in parallel and a group of blades 12', 12'', 12''' which function in series to compress and force air from one compressor to another.

The products of combustion expand through the openings 11'' of successive partitions 11' of the high pressure turbine 7 and then similarly through the openings 11'' in the partitions 11' of the low pressure turbines 8 and 9 by way of the conduit 16. Each low pressure turbine receives half the combustion products discharged from the turbine 7. Since the turbines 8 and 9 function similarly and simultaneously they may be said to function in parallel.

The foregoing is a detailed description of a preferred embodiment of my invention but it is to be understood that right is herein reserved to changes and modifications of the parts described within the scope of the claims appended hereto.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. An internal combustion turbine of the character described, comprising three turbine bodies, a main drive shaft adapted to be driven by said turbine bodies, said bodies being symmetrically arranged around said shaft, and one of said bodies being a high pressure turbine and the remaining two being low pressure turbines, conduits placing said high pressure turbine in communication with said low pressure turbines, three centrifugal air compressors, each compressor being disposed coaxially of each turbine body, rotor shafts joining each turbine body with each air compressor, said shafts being driven by said turbine bodies, whereby each turbine body controls the operation of its associated air compressor, a main gear on said main drive shaft, reduction gears on each of said rotor shafts adapted to mesh with said main gear, a plurality of combustion chambers arranged in said high pressure turbine, and means placing said air compressors in communication with said combustion chambers.

2. An internal combustion turbine as claimed in claim 1, characterized in that each air compressor comprises a partition forming two chambers and two groups of blades, the blades of the first group being arranged in the first chamber and functioning in parallel with each other for sucking air into said first chambers and compressing the same therein, the blades of the second group being arranged in the second chamber of each compressor and functioning in series to compress and force air from one of said second chambers to another, means placing the first chamber of each air compressor in communication with the second chamber of one of said compressors, the second chamber of each air compressor communicating in series with one another, and means placing the last one of the series of said second chambers in communication with the high pressure turbine body.

GIUSEPPE BELLUZZO.