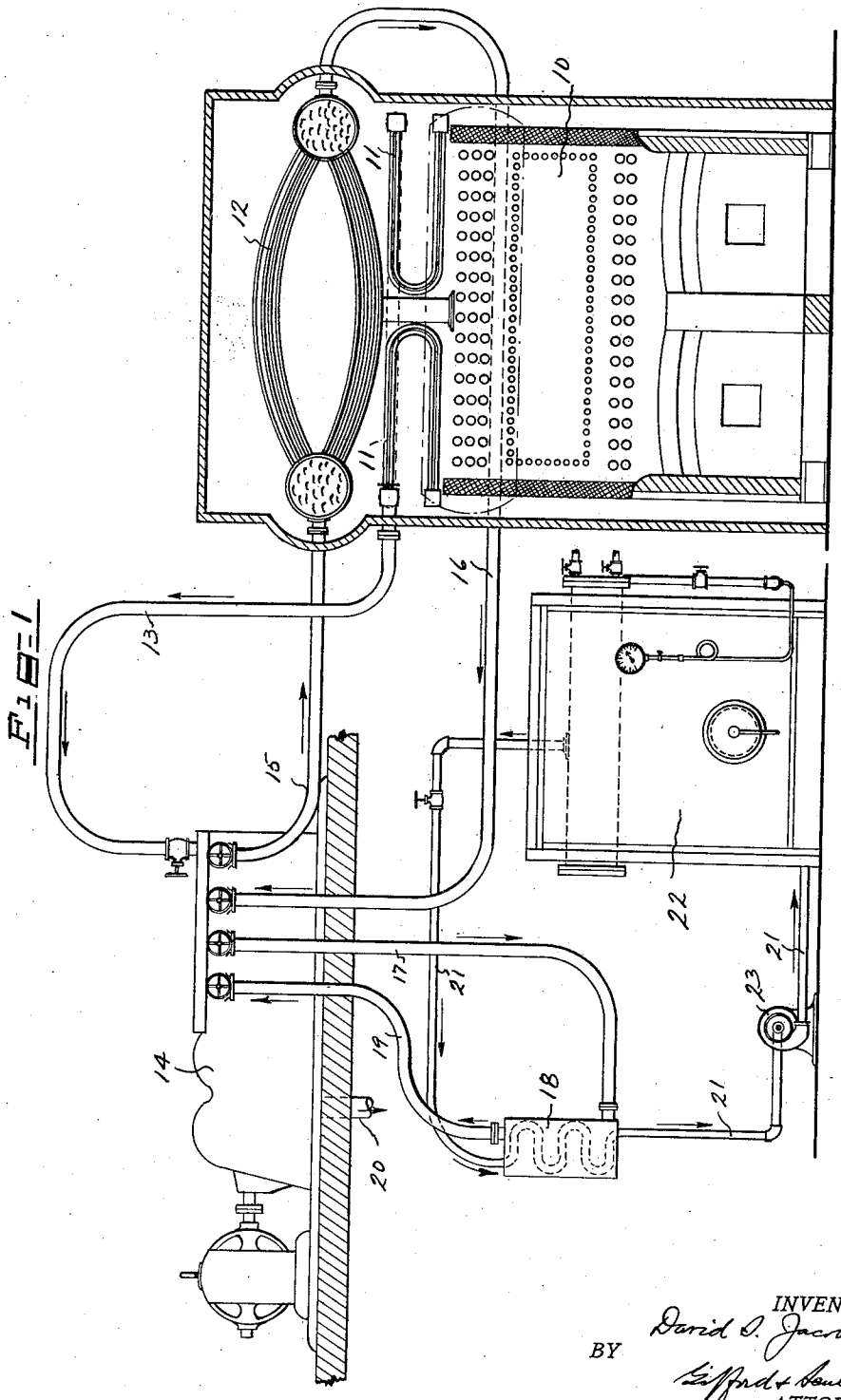
March 18, 1930. D. S. JACOBUS 1,751,238

STEAM POWER SYSTEM

Filed May 26, 1925 2 Sheets-Sheet 1

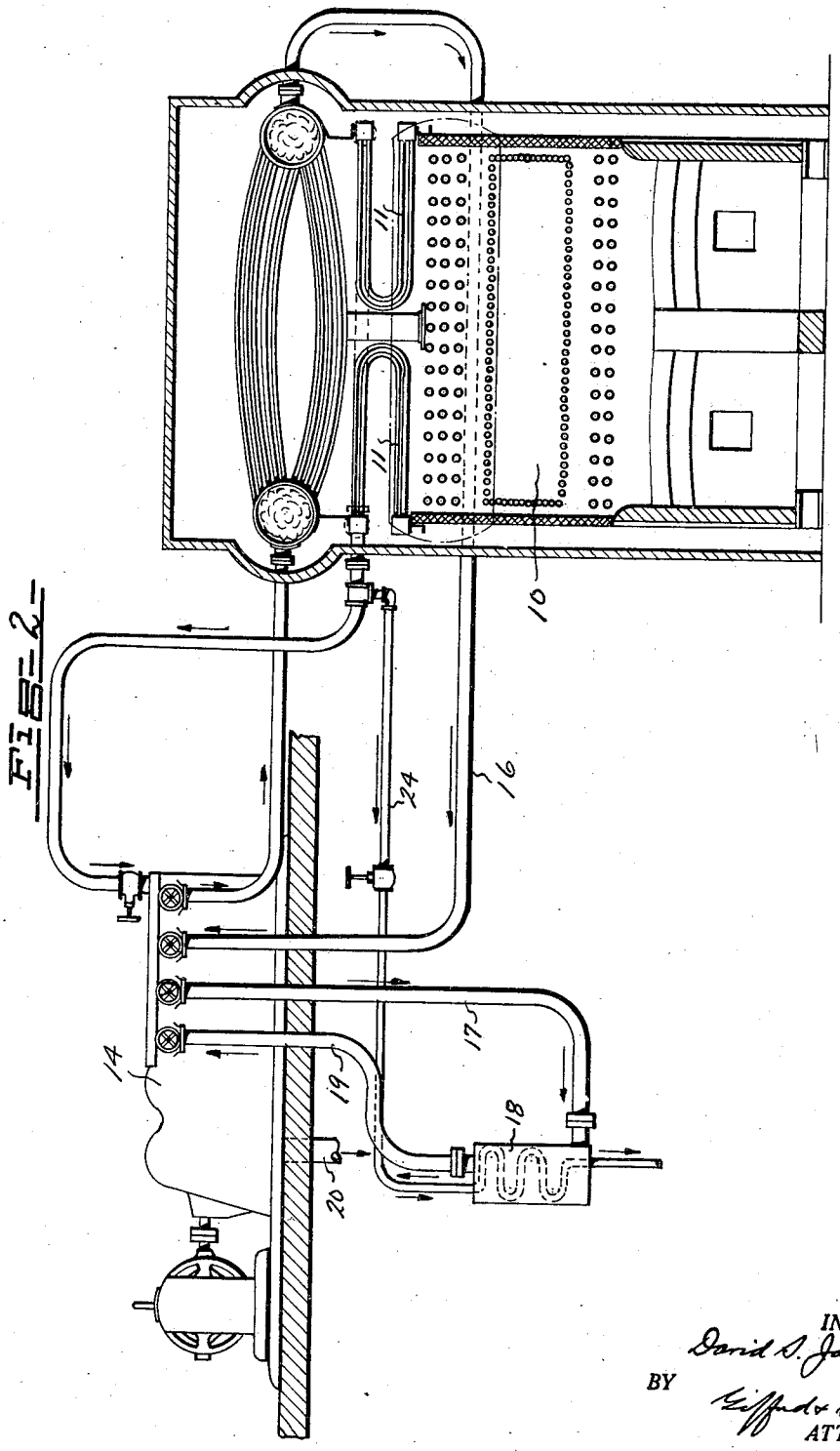


INVENTOR
David S. Jacobus
BY
Gifford & Bull
ATTORNEYS

March 18, 1930. D. S. JACOBUS 1,751,238

STEAM POWER SYSTEM

Filed May 26, 1925 2 Sheets-Sheet 2



INVENTOR
David S. Jacobus
BY
Gifford & Bull
ATTORNEYS.

Patented Mar. 18, 1930 1,751,238

UNITED STATES PATENT OFFICE

DAVID S. JACOBUS, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY

STEAM-POWER SYSTEM

Application filed May 26, 1925. Serial No. 32,907.

My present invention relates to improvements in steam power systems, particularly in such systems in which the prime mover has a plurality of stages and in which some or all of the exhaust steam passing from one stage to another is reheated before entering the lower pressure stage. My invention will be best understood from the following description and the annexed drawings in which Fig. 1 is a more or less diagrammatic representation of a power system embodying my invention, and Fig. 2 is the same as Fig. 1, but showing a modification.

Like reference characters indicate like parts in the different views.

In the arrangement shown in Fig. 1, the steam boiler 10 is provided with superheaters 11 and a reheater 12. Steam from the superheaters 11 pass through the pipe 13 to the high pressure stage of a multi-stage turbine 14. Some or all of the exhaust from this high pressure stage is returned through the pipe 15 to the reheater 12, and from thence the reheated steam flows through the pipe 16 to a lower pressure stage of the turbine 14.

A pipe 17 leads some or all of the exhaust steam from a lower pressure stage to a heater 18 preferably arranged closely adjacent the turbine 14 for a reason to be pointed out hereinafter, and the steam reheated in the heater 18 passes through the pipe 19 to a lower pressure stage of the turbine 14, the exhaust steam from the turbine passing out through the pipe 20. The heater 18 is supplied with heating steam through the pipe 21 connected to an auxiliary boiler 22, the pipe 21, in the form shown, extending continuously through the heater 18 to a pump 23, and from thence to the boiler 22.

The boiler 22 may be of any convenient simple form and preferably will be operated at a relatively high pressure. It will be noted that the heater 18 and the boiler 22 are in a practically closed system, so that, except for accidental losses, the amount of water in such a system will remain constant. Consequently, the boiler 22 will not need any special provision to supply dry steam to the heater 18 and, in fact, the usual steam and water separating drum may be dispensed with in the boiler 22. Furthermore, the pump 23 will be needed only to overcome the frictional resistance to the flow through the pipes, since all parts of the closed system are under the same pressure. Since the same water is circulated over and over again through this closed system, there will be little or no possibility of solids depositing in the tubes of the boiler 22 which, therefore, may be operated at higher pressures without danger of burning the tubes.

The arrangement which I have described is particularly advantageous where it is desirable to reheat successive stages of the exhaust in the prime mover. Ordinarily, a reheater heated directly by the gases of the boiler is the simplest and most economical arrangement, but, in most cases, the boiler room and the turbine room are relatively widely separated, so that the exhaust steam from the turbine must be carried through piping of considerable length to the reheater in the boiler and back again to the turbine. This arrangement will not nullify the advantages of reheating when it is applied to the high pressure exhaust, because of the high pressure of the steam and because the relatively small volume enables the use of relatively small pipes for this purpose. The exhaust from lower pressure stages of the turbine, however, is so much larger in volume because of its lower pressure, that the advantages resulting from the reheating of such low pressure exhaust will be nullified if the steam has to be carried through long piping back to the boiler room and then returned to the turbine. By the arrangement which I have described, the heater for the low pressure exhaust may be located closely adjacent the turbine and, in fact, in the turbine room, so that the exhaust steam has but a short distance to travel to the heater and back again and the large piping which the low pressure exhaust necessitates will, therefore, be relatively short and the losses in such piping will not be sufficient to neutralize the advantages of reheating this low pressure exhaust.

In the modification shown in Fig. 2, I have shown the heater 18 supplied with steam

through the pipe 24 from the main boiler, the parts otherwise being identical with the parts shown in Fig. 1. While this arrangement is simpler in form, it is not so good in other respects as the arrangement shown in Fig. 1. The steam from the heater 18 will, of course, be condensed and this condensate must be returned to the main boiler in the ordinary way with a high pressure pump. Moreover, when the auxiliary boiler 22 is used, it may be operated at higher pressure than the pressure of the main boiler, so that the piping between the auxiliary boiler and the heater 18 may be smaller than is the case where the heating steam is taken from the main boiler. The arrangement shown in Fig. 2 is advantageous, however, in the respects which I have pointed out above in describing the arrangement of Fig. 1, in that the heater 18 may be located closely adjacent the prime mover and the piping to and from the heater 18 will be correspondingly short.

It will be understood that the arrangements which I have shown are merely illustrative and that the embodiment of my invention may be widely varied.

I claim:

A steam power system having, in combination, a boiler setting including a steam-generating boiler, a boiler furnace associated therewith and provided with a passage for the flow of heating gases over said boiler, a multi-stage prime mover, a connection for conveying operating steam from said boiler to a high-pressure stage of said prime mover, a heating element located so as to absorb heat from the gases flowing through said passage, a connection for delivering steam exhausted from said high-pressure stage to said heater, a connection for conveying re-heated steam from said heater to a lower pressure stage of said prime mover, a second re-heater, a second vapor-generating boiler, a closed vapor-circulating system including said re-heater, said second boiler and connections therebetween, means for conveying steam from said lower pressure stage to said re-heater and thence to a third stage of said prime mover, and means for generating vapor for circulation through said closed system independent of said first-named steam boiler or furnace.

DAVID S. JACOBUS.