Feb. 23, 1926. 1,573,792

R. W. ALLERTON

CONDENSER SUPPORT

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Fig. 1.

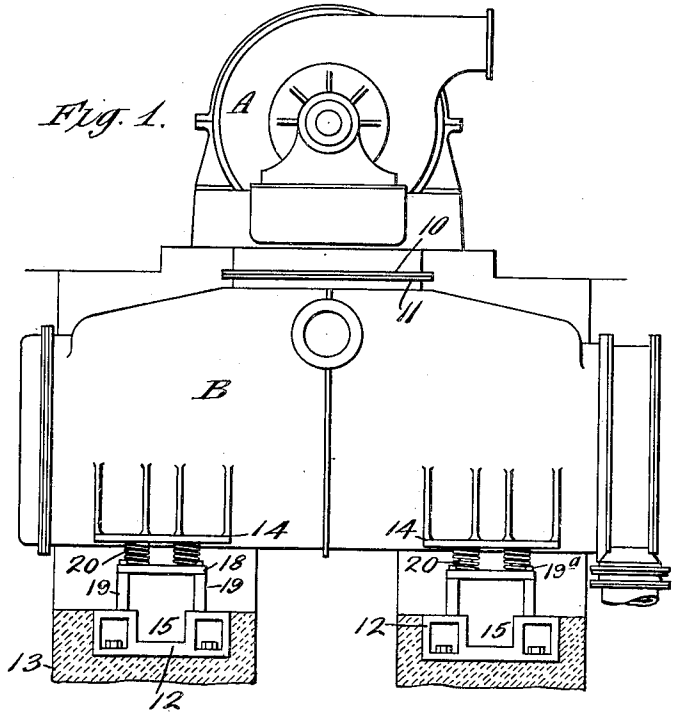



Fig. 2.

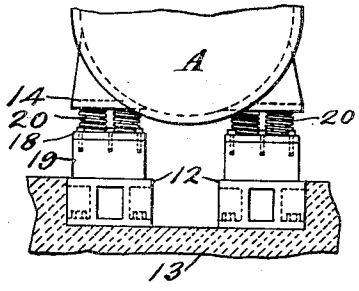
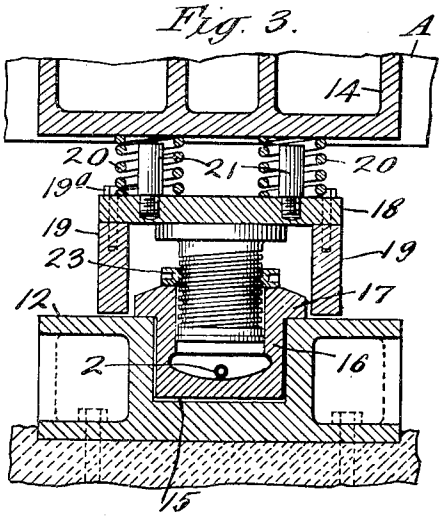



Fig. 3.




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Fig. 4.

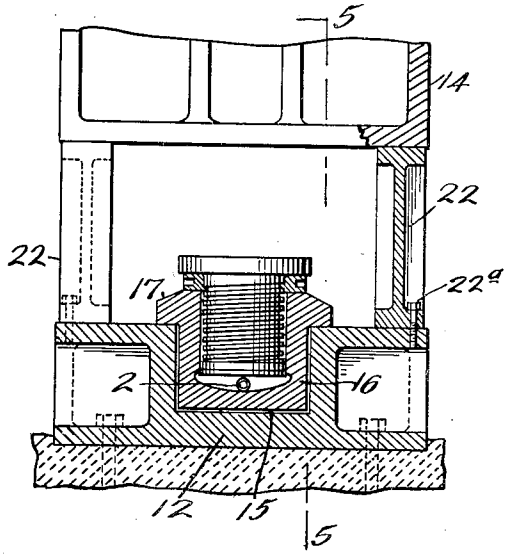



Fig. 5.

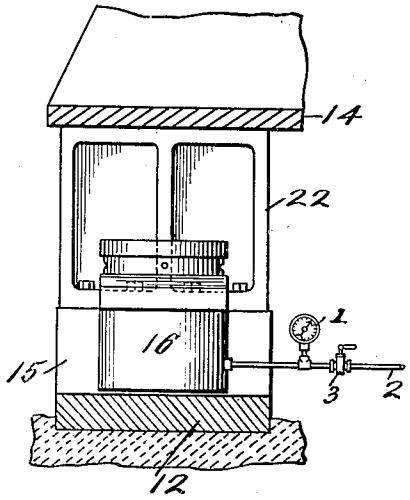
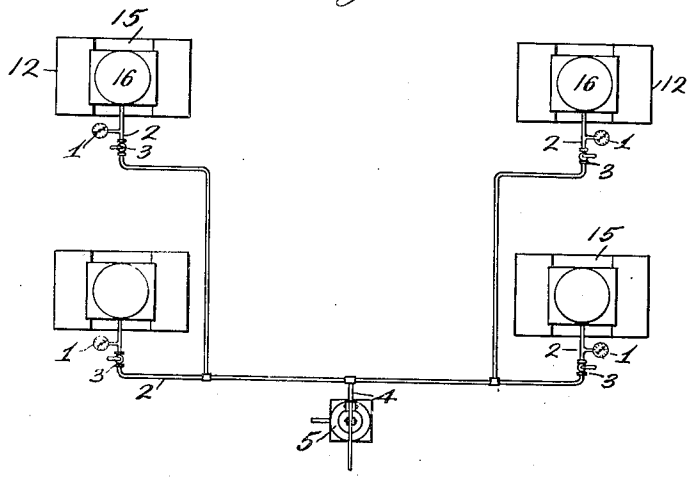



Fig. 6.




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# UNITED STATES PATENT OFFICE.

ROBERT W. ALLERTON, OF SOUTH ORANGE, NEW JERSEY, ASSIGNOR TO WORTHINGTON PUMP AND MACHINERY CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF VIRGINIA.

## CONDENSER SUPPORT.

Application filed April 8, 1924. Serial No. 704,914.

*To all whom it may concern:*

Be it known that I, ROBERT W. ALLERTON, a citizen of the United States, residing at South Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Condenser Supports, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in condenser installations, and particularly to installations of that type using large condensers with steam turbines.

In installations of this kind, the condenser is usually positioned below the engine, with a rigid connection between the turbine exhaust and the condenser inlet. Yielding supports, usually springs, have therefore been used for supporting the condenser so that it may yield or expand downwardly with relatively light changes in the forces acting upon it, thus relieving the exhaust conduit of the turbine of such stresses as might cause misalinement of the turbine shaft or rotor. In some cases, expansion joints are used on the exhaust inlet, instead of a rigid connection.

It is the purpose of the present invention to provide a novel arrangement wherein a set of hyraulic jacks may be conveniently utilized in connection with temporary condenser supporting means, for the purpose of initially and properly adjusting the spring supports, and for testing and removing them. Thus, a set of hyraulic jacks provided with pressure gauges may be temporarily used with the condensers at any time for testing the springs of the supporting units without interfering with the operation of the condensers, and thus enable accurate tests to be made under all conditions of use to determine if each of the spring supporting units is properly supporting its share of the load. This feature of the invention makes it unnecessary to rely upon estimates or other calculations as to the loads which are being carried by such units, not only after initial compression of the springs, but also when the condensers are subjected to temperature changes due to full load thereon and when the turbine is in regular operation.

For a full understanding of the invention, a detailed description of a turbine installation embodying all the features of the invention in a preferred form will now be given in connection with the accompanying drawings forming a part of this specification, and the features forming the invention will then be specifically pointed out in the claims.

In the drawings—

Figure 1 is a side elevation of a turbine installation including condenser supporting means and a base to which the present invention may be applied;

Figure 2 is a front elevation, looking to the right in Fig. 1;

Figure 3 is an enlarged vertical section of one of the supporting units in operative position;

Figure 4 is a view similar to Fig. 3, showing a similar unit with the springs absent;

Figure 5 is a section on the line 5—5 of Fig. 4, and

Figure 6 is a diagrammatic view of the piping system for supplying pressure fluid to the hydraulic jacks.

Referring now to the drawings, and particularly to Figs. 1 and 2, the turbine installation shown by way of example is of the usual form, in which the turbine A is provided with a bottom exhaust conduit having a flange 10 which is connected directly to a flange 11 on the top of the exhaust inlet of a suitable condenser B, preferably of the surface type, having the usual hot well and other connections (not shown).

For the purpose of illustration, four spring supporting units for the condenser B are shown. Each of these units is positioned on and arranged to co-operate with a bed-plate 12, secured in any suitable manner to concrete piers or other suitable base indicated generally at 13, one of such bed-plates being positioned below each of the condenser feet 14. In order to more satisfactorily carry out the present arrangement and also to provide a low condenser supporting construction, the bed-plates 12 are channelled, as indicated at 15. Jacks 16, preferably of the hydraulic type, may thus be slid into the channels and positioned below each of the condenser feet 14, in erecting or repairing the installation as hereinafter described. The jack casings are preferably provided with flanges or ears 17 arranged to rest on the edges of the channels 15. The means for mounting and holding the supporting springs comprises a separate movable member such, for ex-

ample, as plate 18, provided with detachable uprights 19 at the ends thereof preferably being provided which are arranged to rest on the bed-plates 12 when the parts have been satisfactorily adjusted and the jacks removed. In the present instance, four springs 20 are provided for each of the supporting units, pins 21 mounted on the plates 18 acting to hold the springs against displacement during compression.

In erecting the construction above described, the feet 14 of the condenser B are first positioned over the bed-plates 12. The jacks are then slid into the channels 15, connected up to a suitable source of pressure supply, and the condenser raised until the flange 11 on its inlet is in contact with and connected to the flange 10 of the turbine exhaust conduit. Spacing members 22 (Fig. 4) may then be inserted and secured in position by screws 22ª. The jack plungers are then lowered and the plates 18 with the springs 20 positioned thereon positioned over the tops of the jack plungers, which latter are then again raised until the springs 20 are subjected to the full load of the condenser dead weight. The temporary support or spacing members 22 may then be removed and uprights 19 of proper height secured to the plates 18 by screws 19ª or otherwise. The height of such uprights should be such that practically the same compression of the springs will be maintained when the jacks are removed. Pressure gages 1 on the jacks may then be referred to for determining whether each of the spring supporting units is carrying its proper share of the load. The jack plungers may then be lowered and the jacks withdrawn for use on other condensers for similar testing or installation purposes, or for inspection and repair of the jack cupleathers. Lock nuts 23, having threaded engagement with the jack plungers, are provided, which may be screwed down against the jack casings when the jacks are positioned to support the condenser, as shown in Fig. 3, so as to thus support the jack plungers independently of the fluid pressure.

After the condenser supporting parts have been satisfactorily adjusted, and the jacks have been removed, the jacks may be re-installed or used for installing other condensers as desired. If to be used for testing purposes, the jacks after being slid into position are connected up with their pressure connections and the plates 18 thereby raised until the uprights 19 are off of the bed-plates 12. The pressure gauges 1 on the jacks will then disclose the pressure imposed on each of the jacks, so that if a spring-supporting unit, after initial compression or long continued use, has weakened, this will be indicated and the weakened springs may be replaced. In replacing a set of springs, the uprights 19 of such unit are first removed, the spacing members 22 inserted and secured in position as above described, and the jack plunger then lowered. Plate 18 with the springs 16 thereon may then be readily removed, new springs positioned thereon, and the plate 18 returned to position and raised in the same manner as above described in installing the parts.

Referring to Figs. 5 and 6, the pressure connections for controlling all the jacks simultaneously or separately consist of pipes 2 connected to each of the jacks. The pressure gauges 1 above referred to are located in such connections 2 intermediate the jack casings and stop cocks 3. It will thus be seen that pressure fluid may be supplied to only one or more or all of the jacks simultaneously, according to requirements. All of the connections 2 are supplied from a connection 4 communicating with any suitable source of supply, such, for example, as a pump indicated generally at 5. Thus, as the gravitational force imposed on the springs varies after their initial compression or under full load operating conditions, the counteracting pressure of such springs may be readily checked by the use of the gauges 1 and quick determination made as to whether one or more or all of the springs is satisfactorily bearing its or their proper load.

It will be understood that various changes may be resorted to in the construction and arrangement of parts herein shown and described, while still retaining the invention defined by the claims.

What is claimed is:

1. The combination with a condenser, its base, and spring supporting units for said condenser, of separate movable members on which the respective units are mounted, and a jack for each unit including pressure indicating mechanism arranged to co-operate with said base and the movable members for indicating the pressure imposed on the supporting units.

2. The combination with a condenser, its base, and spring supporting units for said condenser, of separate movable members on which the respective units are mounted, a fluid pressure operated jack for each unit including pressure indicating mechanism arranged to co-operate with said base and said movable members for indicating the pressure imposed on the separate units, and means for supporting the movable members when the jacks are removed.

3. The combination with a condenser, its base, and yielding supports for said condenser, of fluid pressure jacks removably positioned between said base and said yielding supports and arranged to support the

latter, and spacing members arranged to be inserted between said base and said condenser for supporting the latter independently of said yielding supports and jacks.

4. The combination with a condenser, its base, and yielding supports for said condenser, of a plurality of movable members on which said yielding supports are mounted, removable fluid pressure jacks interposed between said movable members and said base, temporary supporting members arranged to co-operate with said base and said condenser to support the latter independently of the yielding supports and said jacks, and removable supports between said movable members and base for supporting the condenser by the yielding supports.

In testimony whereof, I have hereunto set my hand.

ROBERT W. ALLERTON.