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AIR COOLING APPARATUS

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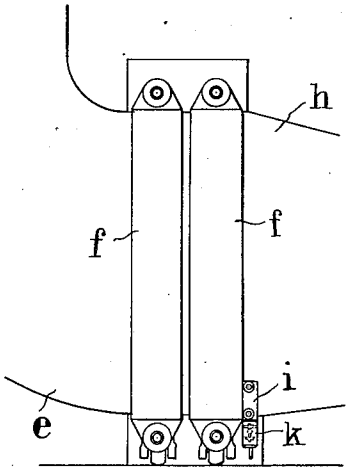


Fig. 2.

Fig. 1

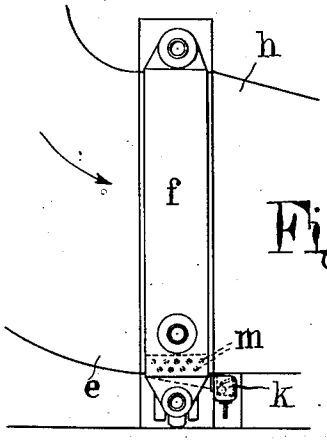


Fig. 3.

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AIR-COOLING APPARATUS.

Application filed September 3, 1925, Serial No. 54,291, and in Great Britain October 21, 1924.

The invention relates to air-cooling apparatus suitable for the ventilation of dynamo-electric machinery, transformers and the like and particularly to the system of air cooling in which a cooler is provided in a closed circuit through which the cooling air is continuously driven.

Difficulties have been met with in such systems owing to the presence of moisture and the object of the present invention is to provide improved means for overcoming such difficulties.

With such an object, the invention consists in the combination of elements hereinafter described and particularly pointed out in the claims.

Referring to the accompanying diagrammatic drawings:—

Figure 1 is a general view of an air-cooled alternator showing the main and auxiliary coolers in position in the air circuit;

Figure 2 is a view to an enlarged scale of the main cooler with the auxiliary cooler attached thereto; while

Figure 3 is a view to an enlarged scale of the main cooler fitted with auxiliary cooling tubes.

The same reference letters are used in the different figures to denote corresponding parts.

In carrying the invention into effect according to the form shown in Figure 1, applied by way of example to a turbine-driven alternator, *a*, a fan, *b*, driven by any suitable motor, *c*, drives air as shown by the arrows through an appropriate duct, *d*, to the alternator, whence it issues by way of a duct, *e*, of increased cross-section to one or more main coolers, *f*, *f*, which may be of any suitable design and are disposed transversely of said duct over substantially its full cross-sectional area, the cooled air thence passing through the converging duct, *h*, to the intake of the fan in order to be re-circulated.

Within this duct, *h*, and preferably behind the main cooler or coolers, *f*, *f*, in the direction of the flow of air, a small auxiliary cooler or condenser, *i*, is provided, separate from the main coolers, the temperatures of the main and auxiliary coolers being adjusted with regard to the dew point to give the essential result sought, namely, to cool in the main cooler and to cool and condense in the auxiliary cooler. Only a small portion of the circulating air passes through or over the auxiliary cooler which extends transversely over only a small portion of the cross-sectional area of the duct and is placed in a position where the air as shown is at a low velocity. In addition baffle plates are or may be provided to prevent the condensate from being swept into the ducts by the flow of air.

Alternatively as shown in Figure 2, the auxiliary cooler, *i'*, may be attached direct to one of the main coolers, *f*.

Condensation being thus localized in the auxiliary cooler, the condensate may be collected in a trap, *k*, or other convenient device and drained off from the air system.

In the case of the steam-driven plant indicated, the condensed steam may conveniently be passed through the main cooler and condenser circulating water through the auxiliary cooler, or alternatively, if the circulating water is passed through the main cooler, water from the town main, from an artesian well, or any other source at a slightly lower temperature may be used for the auxiliary cooler.

Such an auxiliary cooler is of small dimensions and inexpensive and will work effectively when properly adjusted at a temperature only a few degrees below that of the main cooler; as the cooling air is rapidly circulated, the vapour present is condensed in a short space of time and discharged from the system, any subsequent leakage of air into the system being readily dealt with in the same manner.

The action of the auxiliary cooler may be assisted, if necessary, by a small motor-driven air mixer, by air deflectors, or otherwise.

According to a modification of the invention, as shown in Figure 3, instead of using an auxiliary cooler or condenser separate in structure from the main cooler, a few condensing tubes, *m*, *m*, may be embodied in the structure of the latter which are kept at a slightly lower temperature than the remaining tubes by circulating through them a cooling medium at a somewhat lower temperature in accordance with any of the methods described above. These condensing tubes are so arranged that the air travels over them at a lower velocity than that passing through the main portion of the cooler. In this case also, local baffle plates are or may be provided to prevent the moisture which is deposited on the condensing tubes, *m*, *m*, from being swept into the ducts by the flow of air,

and a trap, *k*, or like device is provided for draining off the water condensed.

If desired, the auxiliary cooler may be left in operation while the main plant is shut down so that any surface condensation takes place at the cooler and avoids sweating of the windings.

The structural details of the different elements of the complete cooling system may take other forms than those described above without exceeding the scope of the invention.

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

1. Apparatus for treating a gaseous medium in which aqueous vapour is suspended, comprising in combination a substantially gas-tight endless duct, means for circulating through said duct said gaseous medium and disposed transversely of said duct and over substantially its full cross-sectional area, a main cooler for cooling said medium to a point not so low as the dew point of said vapour and also disposed transversely of said duct but over only a comparatively small part of its cross-sectional area, auxiliary means for drying said medium by condensing aqueous vapor therein suspended.

2. Apparatus for treating a gaseous medium in which aqueous vapour is suspended, comprising in combination, a substantially gas-tight endless duct, means for circulating through said duct said gaseous medium, and disposed in said duct means for cooling the whole body of said gaseous medium during each circulation to a point not as low as the dew point of said vapour and also disposed in said duct condensing means for drying only a part of said body of gaseous medium during each circulation, as set forth.

In testimony whereof we have signed our names to this specification.

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