FURNACE DRAFT FAN MECHANISM AND MOUNTING MEANS THEREFOR

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This invention relates to furnace draft fan mechanism and mounting means therefor, as of coal burning furnaces, and has for an object the provision of improvements in this art.

One of the particular objects of the invention is to provide a very quiet installation in which the vibration of operating mechanism is not transmitted to the furnace. If vibration is kept out of the furnace there will be no noise transmitted through the pipes and conduits connected to the furnace to create unpleasant conditions in the building which houses the furnace.

Another object is to provide a unitary mounting for the rapidly moving main parts of the furnace mechanism. When, according to the present invention, various units having different vibration frequencies are carried on a single mounting their vibrations tend to cancel each other and any registering vibrations are spaced so far apart as to create no objectionable noise patterns.

Another object is to provide a machinery mounting which by a few changes in the positions of parts is adapted to be secured wholly on the furnace for shipment, the position of the main body of the mounting being the same during shipment as in use and thereby minimizing the possibility of improper assembly for service.

Another object is to provide an improved type of resilient mounting for the mechanism of a furnace.

The above and other objects and advantages of the invention will be apparent from the following description of an exemplary embodiment, reference being made to the accompanying drawings, wherein:

Fig. 1 is an elevational perspective view of a coal-burning furnace having a machinery mounting embodying the invention;

Fig. 2 is an enlarged elevation of a machinery mounting alone;

Fig. 3 is a side elevation of the parts shown in Fig. 2;

Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 2;

Fig. 5 is a vertical section and elevation taken on the line 5—5 of Fig. 4; and

Fig. 6 is a horizontal section taken on the line 6—6 of Fig. 2.

The invention has been illustrated and will be described in connection with a coal-burning furnace. The furnace in general is designated by the numeral 10, and comprises a fire box 11, a base and ash pit 12, a stack connection 13, a rotary coal feed tube 14, and an operating machinery assembly which is generally indicated by the numeral 15. The coal feed tube has a rotary fit in a coal tube head 17 and is rotatably supported intermediate its length by a trunnion bearing 16 carried on a strut 19 secured to the base 12. The lower end of the feed tube operates in a coal pile where the interior helicaloid fin or feed screw 20 picks up a quantity of coal at each turn to feed it upward as the tube rotates, but this lower end of the tube is cut away in Fig. 1 to reveal parts therewithin which are more pertinent to the present invention.

The coal tube is rotated, as by a sprocket chain 21 driven by a sprocket gear 22 of a gear box 23, the chain engaging a sprocket gear 24 on the coal tube 17. The gear box is supported on a bracket 23a. To further identify parts, the coal tube carries a cam 25 which actuates the end of a cam follower lever 26 pivoted on a bracket 27 mounted on the base of the furnace. The lever 26 is pivotally connected to a connecting rod 28 which in turn is pivotally connected to a pawl yoke 29 turnably mounted on a turnable shaft 30. A pawl, not shown, at the lower end of the rod 26 engages and turns a ratchet wheel 31 fast on the shaft 30. The shaft 30 operates ash removing mechanism, not shown, beneath the fire bed, which mechanism does not immediately concern the present invention. The ash-removing mechanism deposits the ashes in a vessel which may be removed by way of an opening which is closed by an access door 32. It may be mentioned that the ash-removing mechanism does not need to operate all the time, so a latch device 33 is provided for holding up the outer end of the cam lever 26 at times to keep the inner end of the lever from engaging and being moved by the cam 25. The latch may be actuated at proper times, as when the ash bed registers a low temperature with respect to a heat or glow responsive device in the ash pit, not shown, as by an electro-magnet 34.

Radiator water inlet and outlet connections are shown at 37 and 38 respectively. Hot water connections 39 and 40 are also shown, the whole hot water system, including flue tubes, not shown, being carried by a removable plate 41.

Within the flue of the furnace, specifically with-
in the cylindrical end housing 45, there operates an exhaust draft fan 46 (Fig. 3) the shaft 45 of which extends cut through an oversized hole in a removable cover plate 47 secured by clamps 48. The shaft is rotatably carried by a bearing box 49 mounted on the upper end of a tubular pedestal 50. Specifically, the pedestal has a cap plate 51 welded on its upper end and the bearing box is secured on the plate 51 by bolts 52.

The shaft 45 and the gear drive mechanism in the gear box 23 are driven by a motor 53 mounted on a base bracket 54. The motor has a double sheave pulley 55 on its shaft which through a belt 56 drives a pulley 57 of the gear box 23 and through a belt 58 drives a pulley 59 of the fan shaft 46. The motor is adjustably horizontally on the bracket 54, as by providing either the motor base or the bracket plate with slots 60 (Fig. 4) for the motor attaching bolts 61. The motor attaching plate 60 is adjustively, as by providing the vertical plate 62 of the motor base bracket 54 with slots 63 for the attaching bolts 65 which secure the bracket to a vertical plate 65 secured to the pedestal 50. A brace plate 66 welded to the plates 52 and 54 of the bracket makes it rigid. The vertical plate 65 is secured rigidly to the pedestal as by fillet welding 67.

The drive belts and related parts are so disposed that the horizontal adjustment of the motor mainly affects the tightness of the gear box drive belt 56 without much effect on the belt 58, and the vertical adjustment of the motor mainly affects the tightness of the belt 58 which drives the fan shaft 46 without much effect on the belt 56.

To the back of the vertical plate 65 there is secured, as by fillet welding 70, a horizontal plate 71. Plate 71 is recessed accurately on one end and is rigidly secured to pedestal 50, as by fillet welding 72. To the other end of plate 71 there is secured, as by fillet welding 73, a vertical attaching plate 74. The plate 74 is also secured to the large vertical plate 65, as by fillet welding 75.

Means are provided for supporting the assembly of pedestal and parts carried thereby on the furnace casing for shipment and for resiliently supporting it on the furnace casing after erection and during operation, the pedestal in both cases, however, being held in a given correct position relative to the furnace casing so that erection may be quickly accomplished and with little chance of improper placement of parts.

The assembly includes parts which may be carried directly on the furnace casing having lateral resilience therewith so as to avoid transmitting vibrations through rigid parts from the operating mechanism on the pedestal to the furnace casing.

Near the mid-height of the pedestal there is provided a transverse bar 80 which at its ends is secured by the bolts 81 to the outer ends of resilient shock absorbers 82, as of rubber. The shock absorbers are secured to the furnace casing by their bolts 83 at the other end. The bar ends may be provided with slots 84 open on the sides whereby the connection to bolts 81 may be quickly made without completely removing the nuts from the bolts, and preferably by a turning movement of the bar, the slots for this purpose opening to opposite sides of the bar. Intermediate its ends the bar 80 is secured to the vertical attaching plate 74, as by bolts 85, suitable spacing washers 86 being used as may be needed and the bar and plate being provided with oppositely directed slots 87, 88 whereby adjustment may be achieved. The adjustment is mainly required to place the fan shaft 46 accurately in its oversize hole so it will not strike on the sides of the hole for any vibrations normally encountered.

At its lower end, the pedestal 50 is provided with a lateral slightly flexible base plate 59 which may be secured to the pedestal, as by welding. A bolt 91 is secured in an oversize hole at the outer end of the base plate, nuts 92 being adjustible in position and clamped on the plate. The head of the bolt is upon or may be secured in the upper end of a resilient support 93, as of soft rubber. Herein the head of the bolt is shown to be resting in a depression in the top of the support 93. The resilient support 93 is seated in a hole in a base disk 94 and the disk 54 is secured to an anchor plate 95, as by being welded thereto. The anchor plate is bent upward and provided with slots in which are fastened the lower bolts 96 of resilient elements 97, the upper bolts 98 of the elements 97 being secured to a bent anchor strip 99 which similarly has slots for the bolts. In its other angular portion the strip 99 has a slot 100 which receives a securing bolt 101 by which the assembly is attached to the furnace casing.

With the bolt 101 loosened the assembly is adjusted until the bottom of the anchor plate 95 rests solidly on the floor. The resilient elements 97 being similarly loosened and the parts adjusted until the bolt 91 falls in the middle of the hole in plate 50; or if the bolt is not secured to the resilient support 93, until the head of the bolt 91 comes directly above the top center depression in the support 93. The nuts on the bolt 91 are adjusted until the weight of the pedestal and parts carried thereby is fully carried on the resilient support 93 and the shaft 46 comes in the center of the oversize hole in the furnace casing, as stated. The resilient elements 97 do not take any of the vertical load but merely serve to space the parts from the furnace casing and keep them in position. When this condition exists and when the same condition exists at the resilient feet 82, it is found that there are practically no vibrations transmitted to the furnace casing of sufficient magnitude to cause noise in the metal parts of the heating system.

For shipping purposes the bolt 101 is loosened and the bottom support is turned, as indicated by the arrow and parts as shown in Fig. 2 until it is clear of the lower edge line of the furnace casing.

Also for shipping purposes, when the lower end of the pedestal is not secured, there is provided a bracket 103 which is bolted to the furnace casing plate 47 and to the top of the shaft bearing box 49 to rigidly hold the upper end of the assembly in place with the fan shaft 46 and the fan thereon held firmly in proper position to prevent injury. The bracket is removed when the apparatus is in use so that the resilient mounting will be effective. The bracket may be secured by the bolts which are normally used to secure other parts but if special bolts are used they will be replaced after the bracket is removed or their holes will be closed by any appropriate means.

In use, the pedestal support assembly is resiliently connected at all places, the resilient base element 93 carrying the weight and taking the load vibration and the resilient element 97 holding the assembly in proper position while damping all vibrations travelling toward the furnace casing.

The entire assembly can be removed if necessary by removing the fan cover plate clamps 48 and loosening the nuts on the bolts 81 at the ends
of the bar 80 and taking out one of the bolts 85 so the bar 80 may be turned on the other bolt 85 to free its slots from the bolts 81. It is assumed that the base bolts 81 are not a part of the shock absorber 93 but if they are, the parts may be freed either by taking out or loosening bolt 101 or by removing the top nut 92 from the bolt 91.

If desired, the fan assembly alone may be removed by removing the plate clamps 49 and taking out the bolts 52 which secure the bearing box 49 to the top plate of the pedestal.

It is seen from the above description that the present invention provides a resilient mounting for an assembly which keeps all parts in position relative to the furnace casing but at the same time isolates the vibrations and noises from the casing. It also provides a mounting which is easily assembled. The parts provide quick and ample adjustment and are simple and sturdy.

While one embodiment has been described for purposes of illustration it is to be understood that there may be various embodiments within the scope of the invention.

I claim:

1. Furnace mechanism and mounting means therefor comprising in combination with a furnace casing, a support carrying operating mechanism and mounted thereto for operating the operating mechanism to the furnace casing, a resilient element mounting the support on a fixed base at a distance from the casing and carrying the weight of the support on the base and off the casing, and lateral resilient spacing elements connecting the support to the side of the casing for carrying the weight of the support on the casing.

2. Furnace mechanism and mounting means therefor comprising in combination with a furnace casing resting on a floor and a fan within the casing, a pedestal carrying a fan bearing and fan shaft at its upper end with the fan shaft carrying the fan within the casing and operating in an oversized hole in the furnace casing, a resilient element supporting the pedestal on the floor and carrying the weight of the pedestal and parts mounted thereon on the floor at a distance from the furnace casing, and lateral resilient elements connecting the pedestal to the furnace casing at the bottom and near the mid-height of the pedestal which do not impose the weight of the pedestal on the casing, whereby to support and hold the pedestal properly spaced relative to the casing while dampening vibrations against passage from the pedestal to the casing.

3. Furnace mechanism and mounting means therefor comprising in combination with a furnace casing resting on a floor and a fan within the casing, a pedestal, a shaft bearing carried on said pedestal, a shaft carrying said fan mounted in said bearing on said pedestal, a motor mounted on a bracket on said pedestal and having a driving connection with said fan shaft, resilient supporting means disposed between the pedestal and the floor at a distance from said casing, lateral resilient elements connecting said mid-portion of the pedestal with the casing but not carrying the weight of the pedestal on the casing.

4. Furnace mechanism and mounting means therefor comprising in combination with a furnace casing resting on a floor and a fan within the casing, a pedestal resiliently supported on the floor near the casing, a shaft bearing carried on said pedestal, a shaft carrying said fan mounted in said bearing on said pedestal, a movable bracket mounted for vertical adjustment on said pedestal, a drive motor mounted for horizontal adjustment on said base bracket, said fan shaft and motor being laterally offset from each other, a drive belt extending in an upward direction from said motor to said fan shaft, an operating device associated with said casing and having a drive pulley located approximately at the level of a generally horizontal direction from said motor to said pulley, and vertically spaced resilient elements connecting the pedestal to the casing but not carrying the weight of the pedestal on the casing.

5. Furnace mechanism and mounting means therefor comprising in combination with a furnace casing resting on a fixed base and having a fan within the casing, a pedestal resiliently supported on the base near the casing, a plate rigidly secured on the top of the casing, a shaft bearing carried on said pedestal plate, a shaft carrying said fan mounted in said bearing on said pedestal plate, the fan shaft operating in an oversized hole in the casing, the resilient support for the pedestal including a plate rigidly secured to the lower end of the pedestal and extending laterally therefrom, a resilient pad supporting the outer end of the plate on the base, a vertically adjustable connection between the plate and the resilient pad, lateral resilient elements connecting said resilient pad to the side of the furnace casing for holding the resilient pad and pedestal in properly spaced position relative to the casing but such that the lateral connecting elements are free from vertical load, motor mounting and supporting means connected to the mid-portion of the pedestal, drive means between the motor and the fan shaft, and lateral resilient elements connecting the mid-portion of the pedestal to the motor supporting means with the side of the casing for holding the pedestal in properly spaced position relative to the casing but such that the lateral connecting elements are free from vertical load.

6. Furnace mechanism and mounting means therefor comprising in combination with a furnace casing resting on a fixed base, a pedestal mounted on the base near the casing, furnace operating mechanism mounted on said pedestal, a resilient supporting element between said pedestal and the base, means providing vertical adjustment between the pedestal and base at said resilient supporting element, a lateral horizontal plate secured at one end to said resilient supporting element and extending toward the furnace casing, a member secured to the side of the casing and having a lateral horizontal plate spaced vertically from the first said horizontal plate, a resilient element secured between the vertically spaced adjacent ends of the horizontal plates, and lateral anchorage means connecting the mid-portion of the pedestal with the casing, said lateral anchorage means including laterally spaced vertical plates and resilient elements connected between the vertical plates.

7. Furnace mechanism and mounting means therefor comprising in combination with a furnace casing, a pedestal connected at its mid-portion by lateral anchorage means to the side of the casing, operating mechanism mounted on said pedestal and including a shaft extending
through an oversized hole into said casing and carrying a fan on its end located within the casing, a removable bracket rigidly securing the upper end of the pedestal to the casing to resist vertical and lateral movements of the pedestal relative to the casing, and a resilient base support for the pedestal adapted in use to rest on the floor and having lateral connecting means disconnectible secured to the casing, said lateral connecting means having a laterally resilient element therein.

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