

Dec. 19, 1939.

H. KARLSSON ET AL

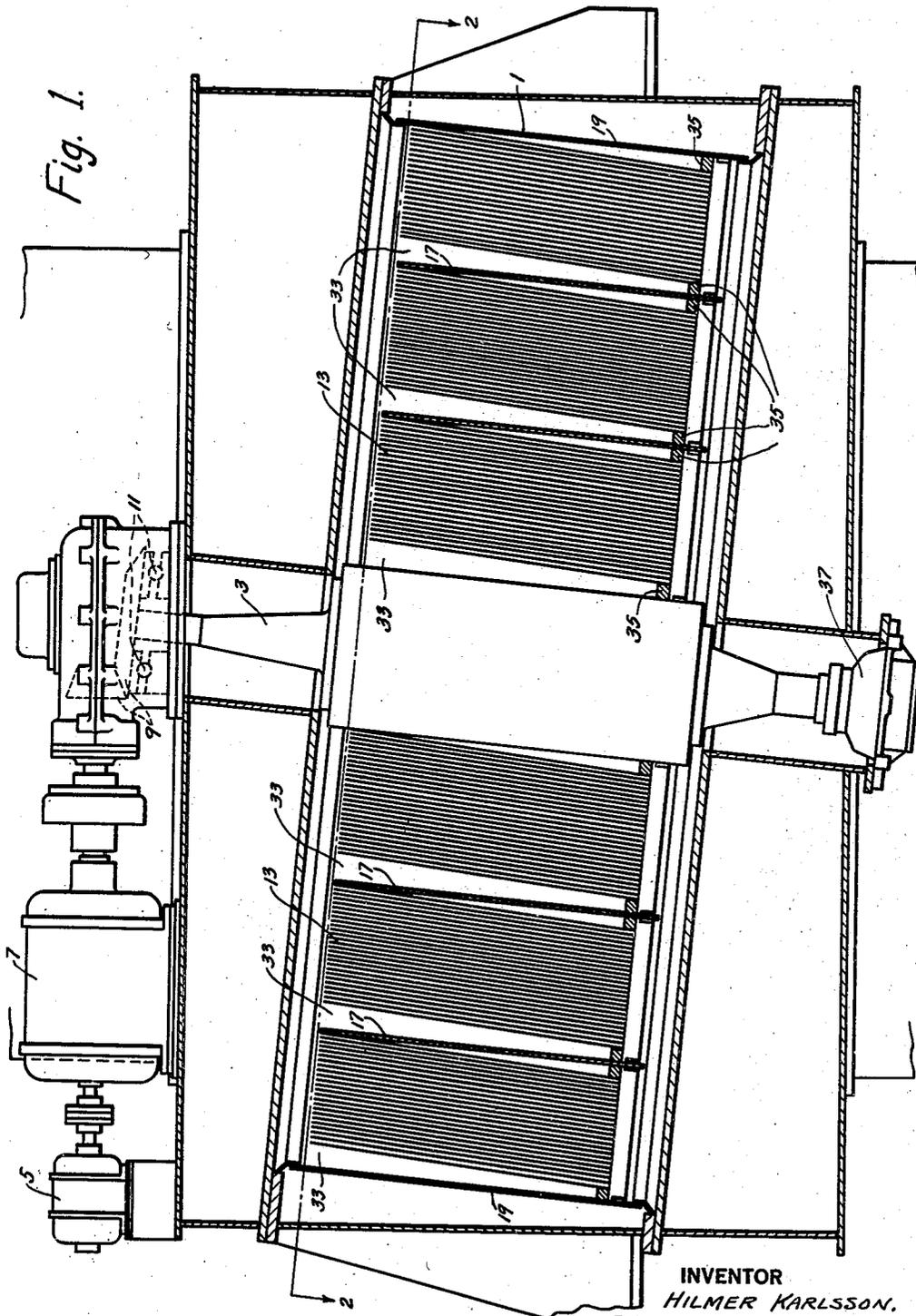
2,183,936

AIR PREHEATER

Filed Jan. 22, 1937

2 Sheets-Sheet 1

Fig. 1.



INVENTOR
HILMER KARLSSON.
BY WILLIAM D. YERRICK.
O. V. Thiele
ATTORNEY

Dec. 19, 1939.

H. KARLSSON ET AL

2,183,936

AIR PREHEATER

Filed Jan. 22, 1937

2 Sheets-Sheet 2

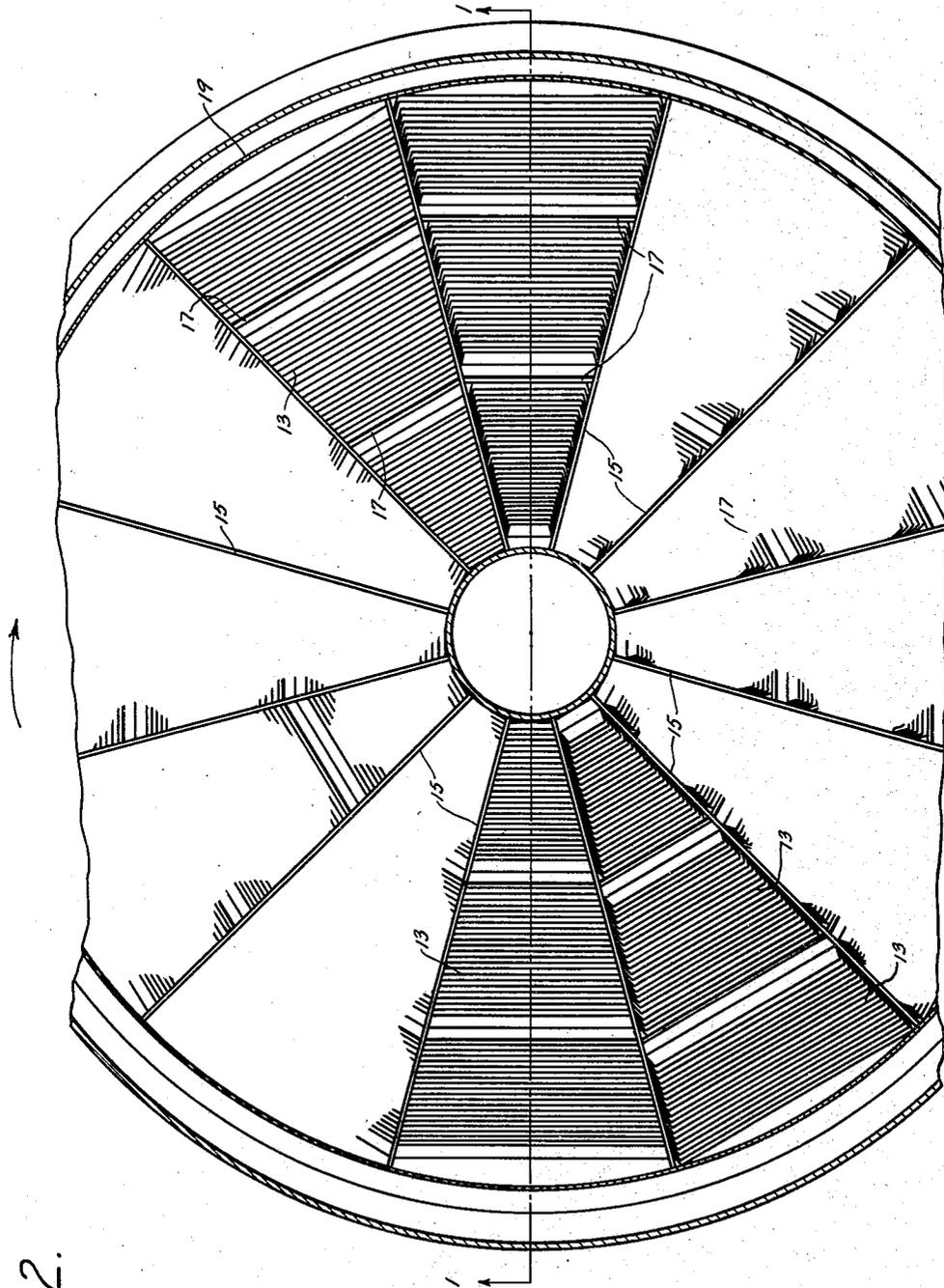


Fig. 2.

INVENTOR
HILMER KARLSSON.
BY WILLIAM D. YERRICK,
W. D. Yerrick
ATTORNEY

UNITED STATES PATENT OFFICE

2,183,936

AIR PREHEATER

Hilmer Karlsson and William D. Yerrick, Wells-
ville, N. Y., assignors to The Air Preheater
Corporation, New York, N. Y.

Application January 22, 1937, Serial No. 121,830

3 Claims. (Cl. 257—6)

The present invention relates to air preheaters of the type usually referred to as "regenerative", in which masses of heat absorbent material are mounted rotatably in such manner that they are alternately introduced into, and made a part of, a passage through which hot gases flow and a passage through which gases to be heated flow. These structures are well known and shown in a number of prior patents such for example as Patent 1,606,306 granted on November 9, 1926, to Ljungstrom.

One of the gases, particularly the heating gas, is frequently charged with more or less solids, as for example soot in the case of gases coming from boiler and other furnaces, or dust in the case of gases coming from smelters, kilns of various kinds, etc. As a result, the small passages in the regenerative mass through which the gases have to flow become clogged. Various means have in the past been suggested for removing such dust, soot, ashes, etc. and while some of them are of practical benefit, there is room for improvement and the present invention provides means for such removal which will be thoroughly reliable and inexpensive.

The invention is illustrated in the accompanying drawings which represent one form of equipment utilizing the invention. Fig. 1 of these drawings is a lateral elevation of the installation, the preheater proper being shown in vertical central section on line 1—1 of Fig. 2, and Fig. 2 is a sectional view on line 2—2 of Fig. 1.

The heater, driving mechanism, etc. are in general very closely similar to those of devices of this sort as used heretofore and may be briefly described as follows: The rotor 1 is mounted on a shaft 3, the latter being driven by a motor 5 through reduction gear 7 and gearing 9. The shaft 3, together with the rotor 1, is supported on the bearing 11. The regenerative material is shown in the present instance as of a usual form and comprises groups 13 of plates each contained in a compartment. These compartments are formed by radially extending partitions 15—15 dividing the space within the rotor into sectors and end walls 19—19, and intermediate partitions 17—17 subdividing the sectors into a number of compartments, the number depending upon the size of the entire structure. The plates 13 are preferably and in accordance with prior practice alternately plain and corrugated in such a manner as to present passages for gases extending through the group from top to bottom. The heating gases are delivered by suitable connections into a chamber below the rotor and flow

through the channels in the regenerative masses into a chamber above the rotor and thence to the stack or other point of disposal. The gases to be heated are delivered by suitable connections to a chamber above the rotor whence they flow through the regenerative masses to a chamber below the rotor and thence to the desired point. The two chambers above the rotor are separated from each other by suitable partitions (not appearing in the drawings) and similarly the two chambers below the rotor are out of communication with each other. All of this is in accordance with ordinary practice and well understood by those conversant with this art. The patent referred to above illustrates it fully.

In practicing our invention, the shaft 3, instead of being vertical as in ordinary practice, is inclined from the vertical as clearly shown in Fig. 1. The amount of inclination will vary in practice, but five degrees may be taken to be a suitable angle.

On account of this tilted position of the shaft 3 there will be a side thrust which is taken up in the bearing 31.

The plates 13 in each compartment do not in our arrangement fill the compartments completely as in ordinary practice but are so arranged as to leave a certain amount of clearance between the group and the partitions 17 and the end walls 19. This clearance appears at 33 at the top of the group. At the bottom the clearance is preferably equally divided between the two sides of the group, and the space between the group of plates and the partition 17 is in each case closed by a plate 35. This leaves the plates free to swing about their lower edges through an arc equal to the clearance, this swinging being caused by gravity as the rotor revolves. The group of plates at the extreme right of the two figures is tilted to the right and the plates will remain in this position until they come around in their rotation in the direction indicated by the arrow to a point toward the extreme left as viewed in the drawings, i. e. toward the highest point through which they move. At a position near this highest point they will tilt over toward the right and assume the position shown in the bundles at the left in the figures. They will keep this position until in the rotation of the rotor they approach the lower position toward the right as shown in the figures, when they will again tip toward the right and assume the position shown for the groups at the right of the figure. This tipping of the plates results not only in a jar but also in a slight frictional movement of the plates over

to each other, both of which will result in dislodging any solid particles such as ashes, soot, dust, etc., which particles will then be carried upward or downward, as the case may be, by the gas current flowing through the mass.

5 While in the specific form described above the plates are shown and described as in a position tangential to the circles in which they rotate, it will be clear that the invention is not confined to a structure with the plates in this particular position. They might be arranged radial- 10 ly or at some other angle. Other variations may be made in practice without departing from the spirit of the invention.

15 What we claim is:

1. In apparatus of the class described, the combination of a rotor frame, means to rotate the frame about an axis inclined away from the vertical, groups of generally upright plates with some play at the top in a direction at right 20 angles to the plates, whereby during a complete revolution of the frame the plates of each group swing about their lower edges taking up said play first in one direction and then in the other, particles of dust, etc., on the plates thereby being dislodged. 25

2. In apparatus of the class described, the

combination of a rotor frame, means to rotate the frame about an axis inclined away from the vertical, groups of generally upright plates with some play at the top in a direction at right angles to the plates, the plates lying generally tangential to the circles in which they rotate, whereby during a complete revolution of the frame the plates of each group swing about their lower edges taking up said play first in a direction toward the axis and then in a direction away from the axis, particles of dust, etc., on the plates thereby being dislodged. 5 10

3. In apparatus of the class described, the combination of a generally cylindrical rotor frame with its axis inclined away from the vertical, means to rotate the frame about its axis, means dividing the space within the frame into compartments two walls of each compartment extending radially from said axis, a group of generally upright plates in each compartment with clearance at the top in a radial direction, whereby during a complete revolution of the frame each group will take up the clearance first in one radial direction and then in the other, and particles of dust, etc., on the plates will be dislodged. 15 20 25

HILMER KARLSSON.
WILLIAM D. YERRICK.