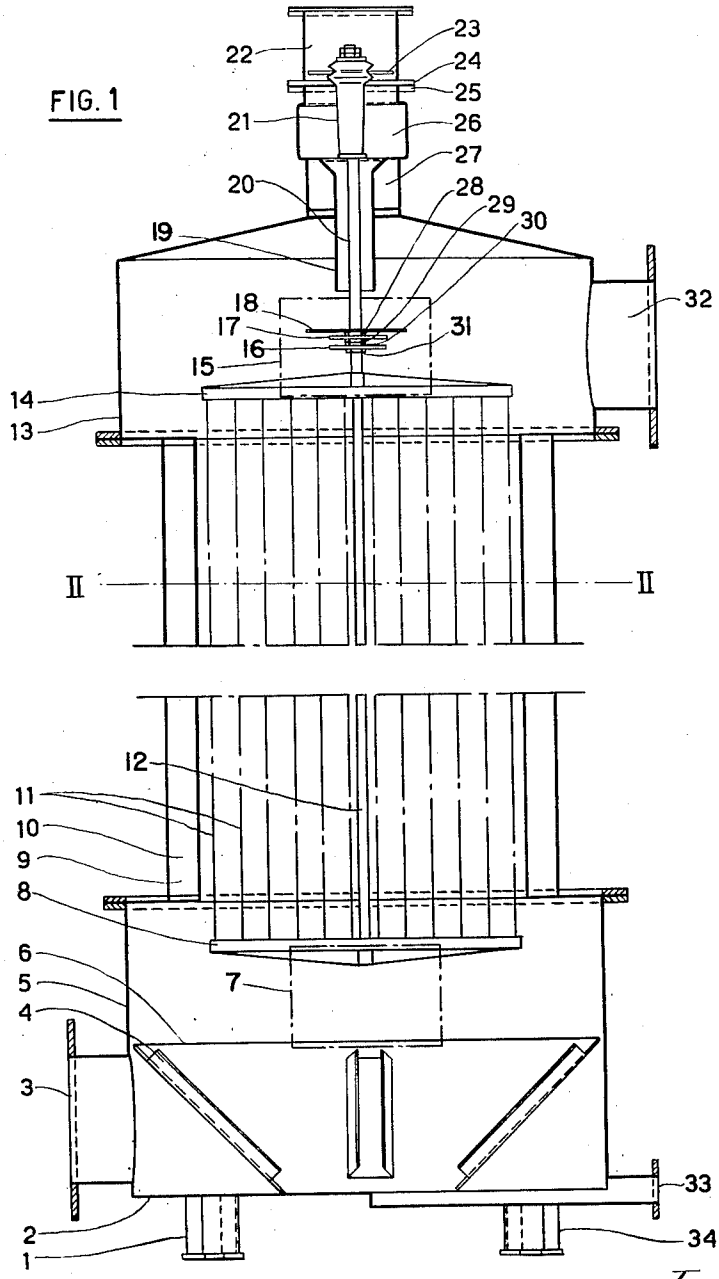
Nov. 4, 1952 J. H. LINDBERGH ET AL 2,616,516

ELECTROFILTER

Filed May 3, 1949 2 SHEETS—SHEET 1

FIG. 1



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FIG. 2

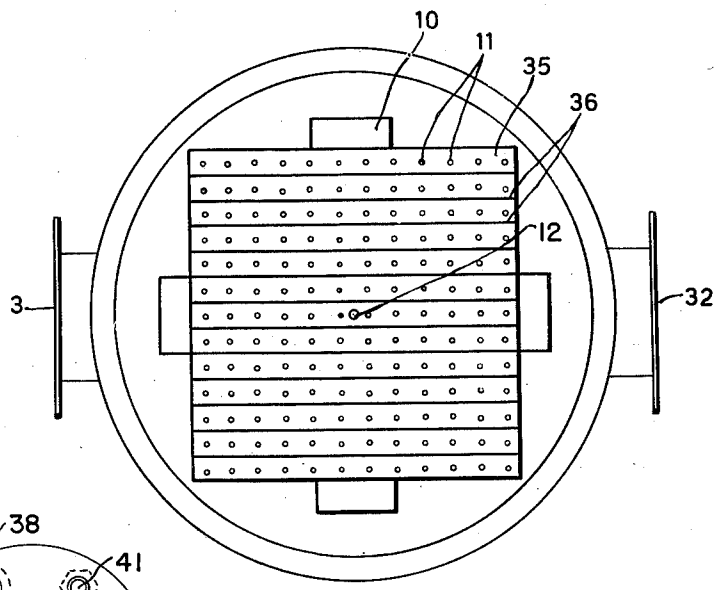


FIG 4

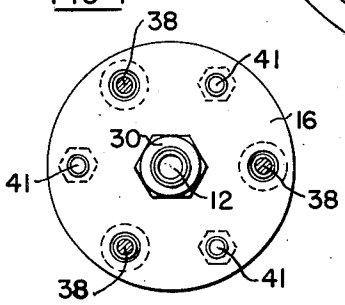
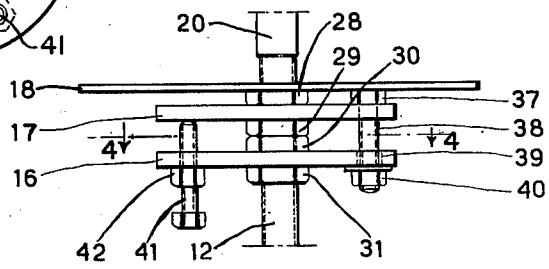


FIG. 3



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ELECTROFILTER

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2 Claims. (Cl. 183—7)

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The present invention relates to an improved embodiment of electro-filters for purifying gases by precipitation of dust and other deteriorations on special precipitating electrodes arranged in the filter. In earlier known embodiments of such filters the electrodes have been arranged as straight wires freely suspended from the top of the filter on springs and weighted in the lower part and held together by means of hooks and couplings. This arrangement has, however, proved to have several disadvantages, among other things, poor wire strength and difficulties in adjusting the position of the wires in the filter.

The principal object of the invention is to produce an improved and simplified arrangement for the assembly itself as well as for support and adjustment of the electrode system. The invention makes it possible to place emission electrodes and precipitating electrodes very near each other without risk of a break down. This is dependent upon the accurate adjustment of the electrode system in the gas stream which now may be effected. In this way it also becomes possible in practice to work with lower voltage distances and due to this maintain a higher degree of separation reckoned per filter volume by the plant. The electrical equipment of the filter may be dimensioned for lower effect and it is possible, for instance, to choose simpler types of construction of rectifier devices required on account of which the gas purifying equipment will be considerably cheaper in production and building as well as in running.

The present invention is characterized principally in that the electrode system consists of a number of emission and precipitating electrodes respectively, arranged between frames at the inlet and outlet ends respectively of the filter, the frames being perpendicular to the longitudinal direction of the filter and provided with fastening means, intended for the electrodes, the fastening means being arranged in pairs and supported by a rod extending through the centre of the frames, the rod being united with the high tension insulater or its extension by means of a link consisting of a fixed upper part and a lower part, being rotatable or displaceable respectively and/or arranged for being tilted.

According to an embodiment of the invention the emission electrodes consist of wires, wound

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in screw form, which have been given a slightly wavy shape and are fastened in rows in the frames between hooks or the like, arranged in pairs and right in front of each other, and the precipitating electrodes are composed of plates disposed between the rows of emission electrodes.

Other characteristic features of the invention are evident from an embodiment more fully described in the following.

The invention will now be more fully described with reference to the accompanying drawings, intended to show an embodiment as an example of the invention. In the drawings:

Fig. 1 shows a vertical cross section of an electro-filter.

Fig. 2 is a horizontal section through the filter from the line II—II in Fig. 1.

Fig. 3 in a larger scale shows the link, arranged between the high tension leader and the electrode system according to Fig. 1.

Fig. 4 is a sectional view taken on line 4 of Fig. 3.

The electro-filter shown in Fig. 1 comprises an upper chamber 13 and a lower chamber 5 surrounding the raw gas inlet 3, and the purified gas outlet 32, respectively. Between the upper and the lower chambers, collecting electrodes and an emission electrode system are enclosed in an intermediate chamber 9. The walls of the intermediate chamber have supports 10 extending vertically along each side for the entire height of the chamber. The chambers are connected by gas-tight joints formed by means of flanges and interposed gaskets or the like. In the upper chamber 13 a high tension insulator 21 having an extension 20 is mounted in gas-tight relation by means of gaskets 23, 24, and 25 to a connection piece 26 having a lower portion 27 which surrounds the lower part of the insulator. This portion 27 of the connection piece 26 is designed as a container for circulating warm water or the like to prevent condensation and deposition of moisture on the insulator which otherwise would increase the risk of flash-over in this part of the filter.

The insulator 21 is provided with a special coupling muff 22 and is fed with a high negative charge from a direct current source not shown. The emission electrode system includes two frames, 8 and 14 which are provided with paral-

lel rows of hooks or the like with the corresponding hooks in each row arranged in alignment transversely of the rows. These hooks or the like are provided for the support of the emission electrodes 11. The frames 8 and 14 are maintained at a set distance from each other by means of a center rod 12. The emission electrodes according to one embodiment of the invention are composed of wires having a slightly wavy shape.

The precipitating or collecting electrodes of the filter are composed of plates 36 disposed in the spaces between the rows of emission electrodes. A convenient way of installing the collecting electrode plates is by welding. Between the supporting rod 12 of the electrode system and the extension rod 20 of the insulator 21, a link is disposed. In the embodiment shown in the drawings, this link consists of an upper disc 17 which is securely fastened to the lower end of the insulator extension rod 20 by means of nuts 28 and 29 which are threaded on said rod 20 and support disc 17 in a fixed position transversely thereto.

A similar disc 16 is provided which is securely fastened upon the upper end of the support rod 12 by means of nuts 30 and 31 which are threaded thereon and support disc 16 in a fixed position transversely to the rod 12.

In accordance with the present invention, the disc 16 is adapted to be adjustably positioned angularly, and to a limited extent, rotatably, with respect to the upper disc 17. By so positioning disc 16, the entire emission electrode system may be angularly positioned or tilted in all planes passing through the axis of the filter and also may be rotated to a limited extent about the longitudinal axis of the electrode system.

To this end, a plurality of bolts 38 having heads 37 are mounted in the upper disc 17 each equally spaced circumferentially thereto, and these bolts 38 extend through suitable enlarged openings 39 provided in the lower disc 16 nuts 40 being threaded on each of the bolts 38 at the inside of the disc 16. Openings 39 in the disc 16 through which the bolts 38 pass are of relatively larger diameter than the diameter of the bolts 38 so that sufficient clearance is provided for tilting the disc 16 angularly with respect to the axis of the bolts 38 and so that the disc 16 can be rotated to a limited extent with respect to disc 17.

In addition to the bolts 38, a plurality of bolts 41 is threaded upwardly through the lower disc 16 at equally spaced intervals circumferentially thereof. Preferably the number of bolts 41 employed corresponds to the number of bolts 38 and the bolts 41 and 38 are arranged alternately with respect to each other as shown, for example, in Fig. 4 of the drawings. The upper ends of the bolts 41 are adapted to engage the underside of the upper disc 17 and lock nuts 24 are provided for securing the bolts 41 in the positions to which they may be adjusted. By proper adjustment of the bolts 41 and the nuts 40 on the bolts 38, it will be apparent that the position of the lower disc 16, and consequently the electrode system, may be angularly positioned or tilted with respect to the upper disc 17 and the longitudinal axis of the filter device. Because the holes in the plate 16 are larger than the bolts it is also possible to rotate the system to a limited extent. The electrode system is accessible for inspection and adjustment through the lower window 7 and the upper window 15. A gas distributing arrangement 6 is placed immediately inside the gas inlet, which arrangement in this case is composed of

a frustum of a cone, having the larger base line at the inside following the wall of the lower chamber immediately above the gas inlet 3 and having the smaller base line lying on the bottom of the filter. A number of openings, four in the embodiment shown, are arranged for the inlet of the gas on the sloping envelope surface of the cone. The gas coming in is thus forced to rise uniformly in the filter and is distributed over the whole electrode system. A certain decrease of the gas velocity takes place there too, which contributes to the high precipitating degree by the filter described. In order to prevent the purified gas to gather and settle deteriorations, which possibly are left, on the high voltage insulator, a tube 19 is arranged around said insulator and in front of the tube a horisontal disc 18, which leads the gas towards the outlet 32 for the purified gas.

On the upper part of the connection piece 26 windows (not shown) are arranged for wiping away deposits on the insulator porcelain.

On part 26 of the filter there is also a faucet (not shown) for de-aerating the filter and prevent explosions on account of remaining air, which has entered the filter and been mixed with the gas at the opening of one of the inspection windows.

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

1. An electro-filter for gases comprising an inlet, an outlet, and an intermediate vertically extending chamber through which gases are adapted to flow from the inlet to the outlet, a plurality of collecting electrode plates extending longitudinally of said chamber, an emission electrode system in said intermediate chamber including a pair of spaced frames and a plurality of parallel rows of emission electrodes extending between said frames, said rows being arranged between the collecting electrode plates, a central support member for the electrode system, an extension member from which the support and electrode system are suspended, said extension member being fixedly mounted at the outlet substantially in alignment with said support member and an adjustable connection between said support member and said extension member, said adjustable connection being angularly adjustable in all planes passing through the vertical axis of said electrode system and also being capable of limited rotation about said axis whereby the emission electrode system may be tiltablv and, to a limited extent, rotatably adjusted.

2. An electro-filter for gases comprising an inlet, an outlet, and an intermediate, vertically extending chamber through which gases are adapted to flow from the inlet to the outlet, an electrode system in said intermediate chamber including electrode elements extending longitudinally of said chamber, a central support member for the electrode system, an extension member from which the support and electrode system are suspended fixedly mounted at the outlet substantially in alignment with said support member, a disc element fixedly mounted on each of said support and extension members in position substantially crosswise thereof and a plurality of adjustable connections between said disc elements, said connections comprising a first group of bolts secured in the extension disc circumferentially thereof and extending through openings in the support disc, and a second group of bolts threaded in said support disc circum-

ferentially thereof and arranged alternately with respect to the bolts of said first group, said bolts of the second group being adjustable to engage the suspension disc, and nuts on the bolts of the first group, said nuts being adjustable to position the support disc angularly with respect to the suspension disc, the openings in the support disc being enlarged to permit limited rotation of the support disc with respect to the suspension disc whereby said electrode system may be tilted with respect to the vertical axis of said filter and rotated to a limited extent about its own axis.

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