

May 16, 1933.

R. HEINRICH

1,908,897

APPARATUS FOR ELECTRICAL PRECIPITATIONS

Filed Dec. 10, 1931

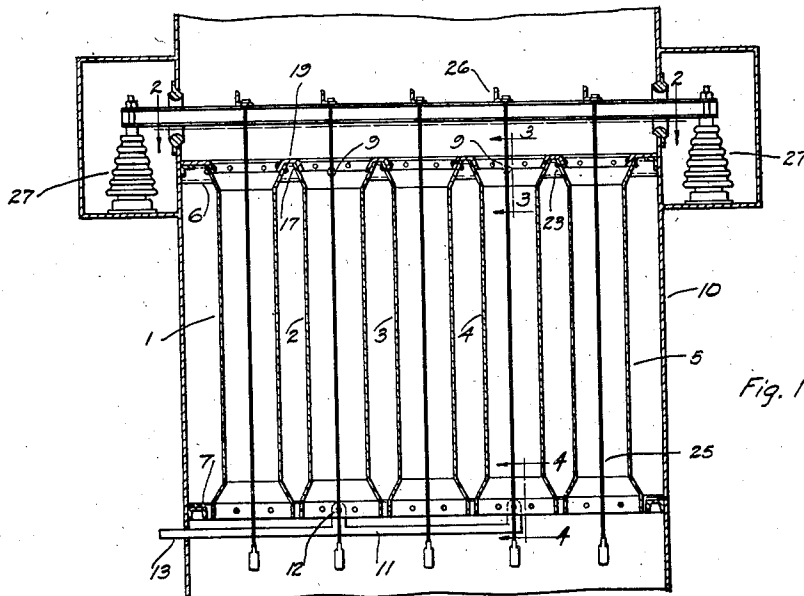


Fig. 1

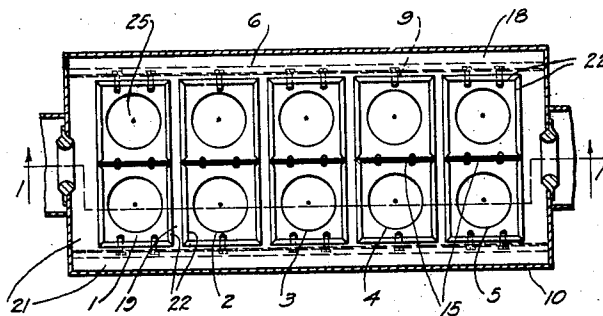


Fig. 2

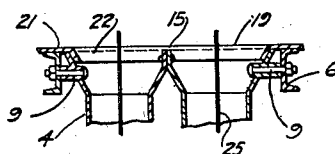


Fig. 3

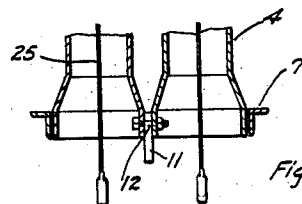


Fig. 4

INVENTOR:
Richard Heinrich,
BY *William P. Knight and*
Alfred W. Knight
ATTORNEYS.

UNITED STATES PATENT OFFICE

RICHARD HEINRICH, OF BERLIN-SUDENDE, GERMANY, ASSIGNOR TO INTERNATIONAL PRECIPITATION COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA

APPARATUS FOR ELECTRICAL PRECIPITATION

Application filed December 10, 1931, Serial No. 580,144, and in Germany December 20, 1930.

This invention relates to apparatus for electrical precipitation of suspended particles from gases, and particularly to the provision of novel and advantageous means for jarring or rapping the electrodes on which precipitation occurs, for the purpose of removing precipitated material therefrom.

In order to maintain efficient operation of an electrical precipitator, it is necessary to remove the precipitated material from the electrodes either continually or from time to time, and this has heretofore been ordinarily accomplished by means of hammers operated either mechanically, pneumatically or electrically, which deliver blows against either the electrode members themselves or against a suitable part of the structure by which such electrode members are supported. In many cases, however, it is difficult to provide a compact arrangement of the electrode members in the precipitator and at the same time provide the necessary space, at the proper positions, for mounting and operation of hammers of sufficient size to effectively jar or vibrate the electrode members.

These difficulties are particularly noticeable in electrical precipitators of the type commonly known as "pipe precipitators", in which pipe-shaped or tubular collecting electrodes are used, and the invention is therefore particularly applicable to this type of precipitator. The invention is therefore shown and described herein as applied to a precipitator of this type, but it will be understood that the method of rapping the collecting electrodes according to this invention is also applicable to other types of precipitators.

In accordance with this invention, the jarring or rapping of the collecting electrodes is provided for by movably supporting alternate collecting electrodes and providing means whereby said movably mounted electrodes may be forcibly moved against the other collecting electrodes which are disposed therebetween. Said other electrodes are preferably, though not necessarily, rigidly supported. By moving the movably

mounted electrodes forcibly against the other, preferably stationary, electrodes, both the movable electrodes and the other electrodes are effectively jarred or vibrated due to the forcible striking of the electrodes against one another. The movable electrodes may be supported in any suitable manner, but are preferably pivotally supported so as to permit swinging movement thereof in such a direction as to strike the other electrodes.

In applying the invention to a pipe precipitator, the pipes are preferably mounted in rows which are alternately fixed and movable, and a suitable operating member is connected to the movable rows and extends to a convenient position for application of a force or blow thereto for effecting movement of said operating member and consequent movement of the movable rows of electrodes. In installations where a considerable number of pipes are used, each row preferably comprises a plurality of pipes, and the pipes in each row are in that case preferably rigidly secured together as by welding, riveting or the like, so that all of the electrodes in any individual movable row may be operated as a single unit by means of a single operating member. Furthermore, the same operating member may advantageously be connected to a plurality of movable rows for effecting simultaneous jarring or rapping of the movable electrodes in said rows as well as the fixed electrodes against which said movable electrodes strike. The above construction has the advantages of providing blows of considerable effective force and consequent efficient jarring of the electrodes, due to utilization of the mass of the movable electrodes themselves for providing an impact of considerable magnitude, and at the same time minimizing the additional space required for the jarring means.

The accompanying drawing illustrates a pipe precipitator constructed in accordance with this invention, and referring thereto:

Fig. 1 is a vertical section of the precipitator, on line 1—1 in Fig. 2.

Fig. 2 is a horizontal section on line 2—2 in Fig. 1.

Fig. 3 is a fragmentary section on line 3—3 in Fig. 1, showing the construction and pivotal mounting of the movable electrodes.

Fig. 4 is a fragmentary section on line 4—4 in Fig. 1, showing the connection of the movable electrodes to the operating means for effecting movement thereof.

The apparatus comprises a precipitating chamber 10 within which are mounted a plurality of vertically disposed cylindrical pipes which constitute the collecting electrodes, such pipes being mounted in rows indicated at 1, 2, 3, 4 and 5. There may be any suitable number of rows and any desired number of pipes in each row. Alternate rows of pipes, such as rows 1, 3 and 5 are fixed or stationary, being secured for example to supporting bars or members 6 and 7 at the upper and lower ends thereof.

The remaining rows of pipes, namely, the rows indicated at 2 and 4, are pivotally supported at their upper ends as, for example, by means of pins or pivot members 9 which are in turn supported on the above-mentioned supporting members 6. An operating member, such as bar or rod 11, is connected to all of the pipes in each movable row, for example as indicated at 12, and extends to a suitable position for delivery of a blow or force against said operating member, for example to a position outside the precipitating chamber, as indicated at 13. Motion may be imparted to said operating member in any suitable manner, as for example by connecting the same to a mechanism for imparting oscillatory longitudinal movement thereto.

The upper and lower ends of the collecting electrode pipes are preferably flared outwardly as shown, and the extremities of the flared portions are preferably made of square or rectangular shape, as shown. The upper ends of all of the pipes in each row are preferably rigidly secured together, as shown at 15, as for example by riveting or welding. The lower ends of the electrode members in each row may also be rigidly secured together in any suitable manner. In Fig. 4 the connection between the two electrodes in each movable row is shown as provided by the bolt 12 which also serves to connect the same to the operating means 11, but it will be understood that, where more than two electrodes are provided in each row, the connection between the lower ends of all of said electrodes in each movable row, as well as the connection thereof to the motion imparting means, may be made in any suitable manner.

Means are preferably provided for closing the spaces between the upper ends of the fixed and movable electrode pipes, as at 17, in order to prevent leakage of gas therebe-

tween. The sealing of these spaces may advantageously be provided by means of a cover plate 18 which comprises strips 19 extending across over the top of the spaces 17 between the respective rows of pipes and also comprising portions 21 extending outwardly from the upper edges of the electrode pipes to the walls of the precipitating chamber 10. Said cover plate is also preferably provided with downwardly inclined flange portions 22 which extend down from the strips 19 and into the flared upper end portions of the pipes. Said cover plate may be secured in any suitable manner, for example by securing the same to the fixed electrode pipes, as shown at 23, but is preferably free from any rigid connection to the movable electrode pipes, so as not to interfere with the free movement thereof.

A suitable discharge electrode member, such as a wire or small diameter rod 25 extends axially of each collecting electrode pipe. Said discharge electrode members may be supported at their upper ends by any suitable supporting frame such as indicated at 26, and said frame may be mounted on suitable insulating supports 27. It will be understood that the discharge and collecting electrode systems may be connected, in the usual manner, to the respective terminals of any suitable source of electric current adapted to maintain a sufficient electrical potential difference therebetween to provide electrical precipitation. The electrical potential difference applied to the electrodes is preferably, although not necessarily, unidirectional.

In operation the gas carrying suspended particles is admitted to the chamber 10 either below or above the collecting electrode pipes and passes either upwardly or downwardly therethrough. The suspended particles are precipitated in the usual manner upon the internal surfaces of the collecting electrode pipes of the rows 1 to 5 inclusive. Undue accumulation of the material thus precipitated, upon the walls of said pipes, is prevented, and the walls of said pipes kept substantially clean, by continually or intermittently moving the operating bar 11 so as to impart vibratory motion to the lower ends of the movable electrode rows 2 and 4. In such vibratory movement the movable electrodes in said rows swing about their pivots 9 and strike the lower ends of the fixed electrodes in rows 1, 3 and 5. A powerful blow or jarring action is thus imparted to both the movable and fixed electrodes, causing them to vibrate with sufficient intensity to dislodge substantially all deposited material from the surfaces thereof. Such material falls by gravity into a suitable hopper or other collecting means which may be provided below the collecting electrode pipes. In this manner the collec-

ing electrode surfaces may be kept substantially clean at all times, and highly efficient electrical precipitation may thus be maintained.

5 I claim:

1. In an electrical precipitator, a plurality of collecting electrode pipes disposed in rows, the collecting electrode pipes in alternate ones of said rows being movably mounted, means for forcibly moving said movably
10 mounted rows of electrodes against the other electrodes, and discharge electrode means opposing the respective collecting electrodes.

2. In an electrical precipitator, a plurality of rows of collecting electrode pipes extending side by side, each of said rows comprising a plurality of pipes, the pipes in alternate rows being movably mounted and the pipes in the other rows being substantially fixed, means for moving said movably mounted pipes against the substantially fixed pipes, and discharge electrode means extending axially within the respective
20 pipes.

3. A construction as set forth in claim 2, and comprising in addition, means substantially sealing the spaces between the movably mounted and fixed electrode pipes against passage of gas therebetween while
25 permitting free relative movement thereof.

4. The construction as set forth in claim 2, the collecting electrode pipes in each row being rigidly connected together.

In testimony whereof I have hereunto
30 subscribed my name this 24th day of November 1931.

RICHARD HEINRICH.

40

45

50

55

60

65