June 8, 1926. 1,588,072

C. H. WEISKOPF.

APPARATUS FOR THE ELECTRICAL PRECIPITATION OF SUSPENDED PARTICLES FROM GASES

Filed March 27, 1923 2 Sheets-Sheet 1

Fig. 1.

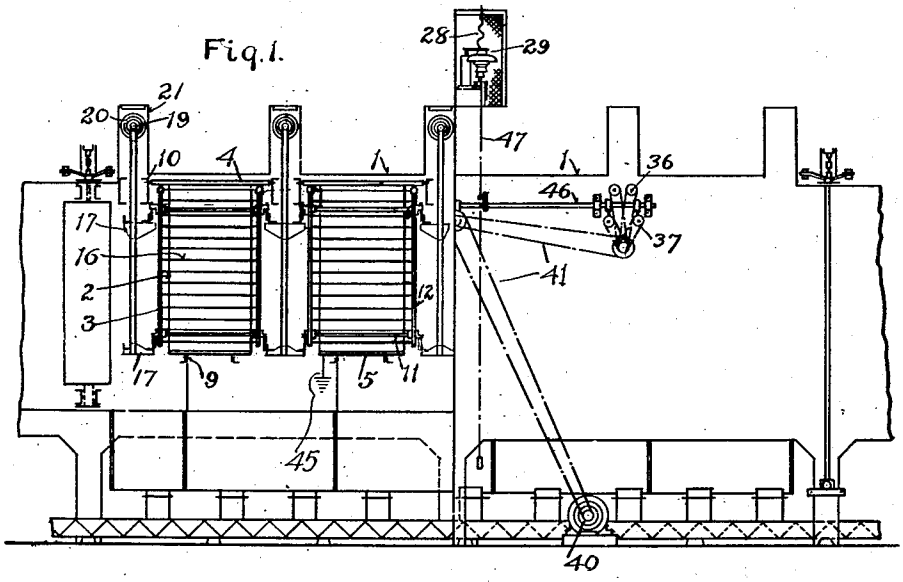


Fig. 2.

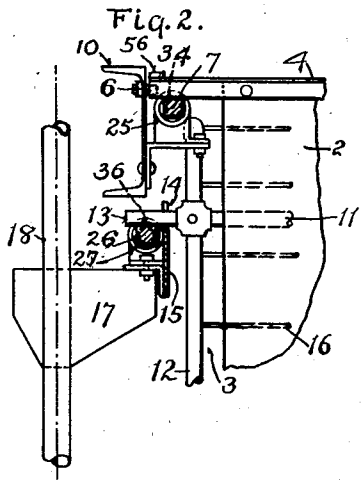
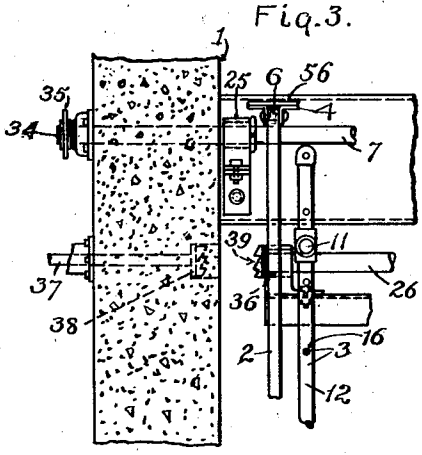


Fig. 3.



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Fig. 4.

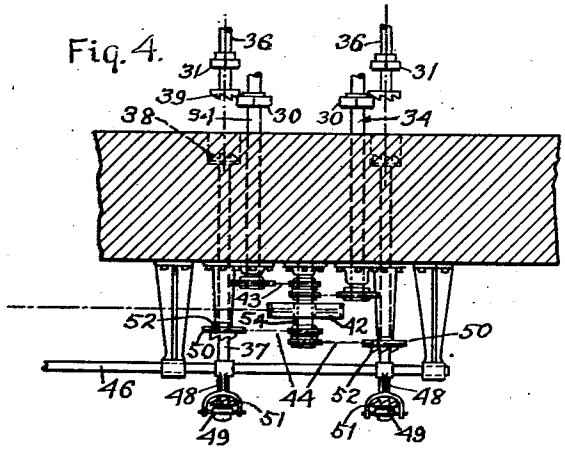


Fig. 5.

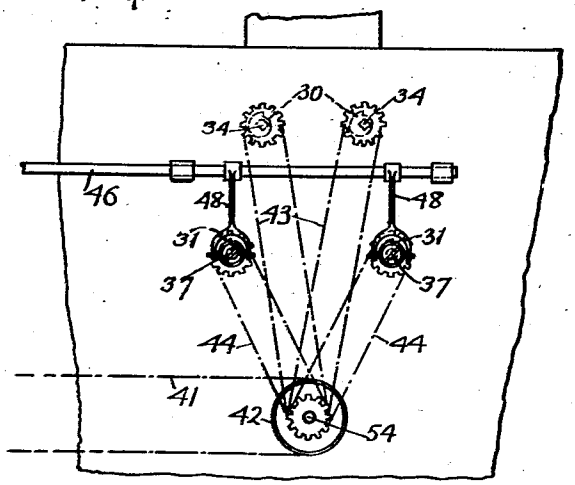


Fig. 7.

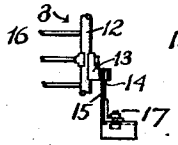


Fig. 8.

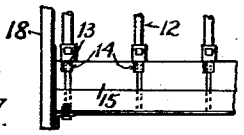
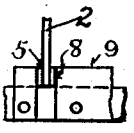


Fig. 6.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE ELECTRICAL PRECIPITATION OF SUSPENDED PARTICLES FROM GASES.

Application filed March 27, 1923. Serial No. 628,052.

The invention relates to the precipitation of suspended particles from gases by electrical action, and the main object of the present invention is to provide an electrical precipitator with simple and effective means for removing the precipitated material from the electrodes thereof.

This application contains subject matter originally described in my application, Serial No. 501,840, filed September 19, 1921, which has matured into Patent #1,463,352.

The accompanying drawings illustrate embodiments of my invention and referring thereto:

Fig. 1 is a partly sectional side elevation of an electrical precipitator provided with means for cleaning electrodes by lifting and dropping the same.

Fig. 2 is a partial elevation of the electrode supports for the electrical precipitator shown in Fig. 1.

Fig. 3 is a side elevation of the construction shown in Fig. 2, a portion of the precipitator wall being shown in section.

Fig. 4 is a plan view of the operating means shown in Fig. 1, a portion of the precipitator frame being shown in section and a modified form of lifting means being shown.

Fig. 5 is a side elevation of the mechanism shown in Fig. 4.

Fig. 6 is a side elevation of spacing means for the collecting electrodes.

Fig. 7 is a partial end elevation and Fig. 8 is a partial side elevation of the lower guiding supports for the discharge electrodes.

The electrical precipitator shown in Fig. 1 comprises one or more flues or chambers 1 adapted to receive and conduct the gas to be treated and having mounted therein the electrodes for effecting electrical action on the gases to precipitate suspended material therefrom; said electrodes comprising collecting electrodes 2 and discharge electrodes 3. The collecting electrodes 2 preferably comprise plates, screens, or similar means extending longitudinally in the flue and parallel to the path of the gases passing through said flue, a plurality of such members being arranged in a row extending across the flue or chamber 1. The discharge electrodes 3 extend vertically between the successive collecting electrodes.

Each collecting electrode 2 may, as shown in Fig. 1, consist of a vertical plate hung from top bars 4 and having a reenforcing bar 5 at its lower edge. The electrodes 2 are preferably loosely mounted to enable vertical vibration or movement thereof, this being effected, for example by providing each electrode with two top bars 4 rigidly secured to opposite sides of the electrode and resting on supporting means 7, hereinafter described, said bars 4 embracing lugs 6, on stationary frame beams 10 so that the weight of the electrode rests on said means 7 but the electrode can move freely upward. The lower bars 5 of the electrode pass loosely through notches 8 in a fixed spacing bar 9 (see Fig. 6) to hold the electrodes from lateral displacement while permitting vertical motion thereof.

Each discharge electrode may consist of a vertical frame and discharge electrode elements mounted in said frame, the frame consisting of cross-bars 11 and side bars 12, having lugs 13 resting loosely in notches 14 on upper and lower supporting beams 15 at each end of the frame, so as to permit free upward movement and rattling movement of the electrodes. Any suitable discharge electrode elements may be mounted on said frame. I prefer, however, to use bars or rods 16 mounted in the said frame bars 12. The said discharge electrode members 16 may consist of metal rods of any suitable cross-section, but in any case the said discharge electrode members are spaced sufficiently far apart to enable each of said electrode members to produce its own individual field without undue interference from the adjacent discharge electrode members. The discharge electrode supporting beams 15 are mounted on brackets 17 which may be hung by bars 18 from beams 19 resting on insulators 20, which may be mounted in suitable housings 21 above the flue or chamber 1. The lower ends of the discharge electrode frames are spaced and guided in notches 14 in lower frame bars 15 (as shown in Figs. 7 and 8).

The high tension discharge electrodes are connected to suitable energizing means for

supplying the same with rectified current of high potential, such current for example, being supplied from a suitable alternating current source through a step-up transformer and rectified by a mechanical rectifier in a manner disclosed in Patent to F. G. Cottrell, No. 895,729, August 11th, 1908, the high tension discharge system above described being connected to such rectifier through a connection, 28, including a cutout switch 29, and the collecting electrode system being grounded in the usual manner, as indicated at 45 in Fig. 1.

I provide for raising the electrodes bodily and dropping them. The collecting electrodes 2 rest by their top bars 4 on cam bars formed, for example, as square bars 7, as shown in Figs. 2 and 3, which are mounted to turn in bearings 25, so as to intermittently raise the collecting electrodes. Similarly, the discharge electrodes 3 are mounted to rest on cams or square bars 26 mounted to turn in bearings 27.

Instead of the square shafts for lifting and dropping the electrodes, I may use cams, as indicated in Figs. 4 and 5 at 30 and 31. rigidly mounted on shafts 34 and 36 for lifting the collecting electrodes and the discharge electrodes, respectively, the construction being otherwise as above described in connection with Figs. 1, 2, and 3.

In each of these cases the mounting of the electrodes is such as to permit a free upward movement thereof so that the full jarring effect of the vertical impact due to the sudden arrest of the downward movement is secured, the electrodes rebounding slightly on such impact so as to rattle or vibrate on or within their supports. The operating shafts 34 for the lifting means for the collecting electrodes, are provided with operating gears 35 operated by chains, or otherwise, from any suitable motive device. For operating the lifting shafts 36 for the discharge electrodes a separate shaft 37 may be provided, mounted to turn in a suitable fixed bearing and movable slightly endwise therein, so as to bring a clutch member 38 thereon into engagement with a clutch member 39 on the lifting shaft 36. The several shafts 34 and 37 aforesaid may be operated from an electric motor 40 through belt or chain conn ctions 41, 42, 43 and 44, indicated in broken lines in Figs. 4 and 5.

For control of the operating mechanism for the discharge electrodes, I may provide a rock shaft 46 manually operated in any suitable manner, for example, by connection to a switch pull-cord 47 for operating switch 29 controlling the current to one section of the electrical precipitator, said rock shaft carrying levers 48 to which are pivoted collars 49 engaging with the respective shafts 37 for said section of the precipitator in such manner that rocking of the shaft 46 by operation of the pull-cord 47 will cause the shafts 37 to move longitudinally so as to bring clutches 38 thereon into clutch with clutch members 39 on the shafts 36, the effect of this operation being to simultaneously open the energizing circuit to the electrical precipitator section and to mechanically connect the operating shafts 37 to the lifting shafts 36. At the same time the shaft 37 itself may be brought into operative relation with a drive pulley indicated at 50 by engagement of a clutch 51 on shaft 37 with a clutch 52 on said drive pulley. The respective drive pulleys 50 may be operated by belt connections 44 from the shaft 54 of a pulley 42 forming a part of the driving system for the shafts 34 aforesaid.

In each of the forms of the invention above described the collecting electrodes normally rest on stationary supports which may consist either of lifting bars (square bars) as shown in Figs. 2 and 3 or cams as shown in Figs. 4 and 5 or may consist of stationary frame bars shown at 9 in 1 and 6, said electrodes resting on the bottom of notches 8 in said bars, or the collecting electrode may have a cross plate 56 at its upper end normally resting on the lug 6 aforesaid to support the electrode and receive the impact of the electrode when the latter is dropped. The discharge electrodes normally rest either on the operating square bars or the lifting cams or on any other suitable stationary supports, for example the lugs 13 may normally rest on the bottom of the respective slots 14. In the operation of the jarring device, the rotation of the cam shafts causes the electrodes to be raised from their normal position and to be suddenly dropped onto the stationary supports therefor, so as to jar the electrodes and dislodge deposited material therefrom.

What I claim is:

1. In an electrical precipitator a plurality of electrodes mounted to move vertically, and independently of one another, each electrode having a frame means normally resting on stationary supporting means and cam means directly engaging said frame means for intermittently lifting each of said electrodes and allowing it to drop on such stationary supporting means to jar the electrode.

2. In an electrical precipitator a plurality of collecting electrodes mounted to move vertically and independently of one another, each electrode having a frame means normally resting on a stationary supporting means, and cam means directly engaging said frame means for intermittently lifting each of said collecting electrodes and allowing it to drop on said stationary supporting means to jar the electrode.

3. In an electrical precipitator a plurality of discharge electrodes mounted to move ver-

tically and independently of one another, each of said discharge electrodes comprising a frame means and discharge electrode elements mounted in said frame means, an insulated support on which said discharge electrodes are normally supported and cam means mounted on said insulated support and adapted to directly engage said frames of each of said discharge electrodes to lift the discharge electrode and to permit it to drop into contact with said support to jar the electrode.

4. In an electrical precipitator a construction as set forth in claim 3 and comprising, in addition, operating means for said cam means, comprising clutch means adapted to be disengageably connected with the said cam means to operate the same for jarring the electrode and to permit of normal disengagement of said cam means so as to maintain the insulation of the discharge electrode.

5. In an electrical precipitator a construction as set forth in claim 3 and comprising in addition operating means for said cam means comprising clutch means adapted to be disengagedly connected with the said cam means to operate the same for jarring the electrode and to permit of normal disengagement of said cam means so as to maintain the insulation of the discharge electrode, and manual controlling means for operating said clutch means to bring the cam means into or out of operative connection with said operating means.

In testimony whereof I have hereunto subscribed my name this 19th day of March, 1923.

CHARLES H. WEISKOPF.