

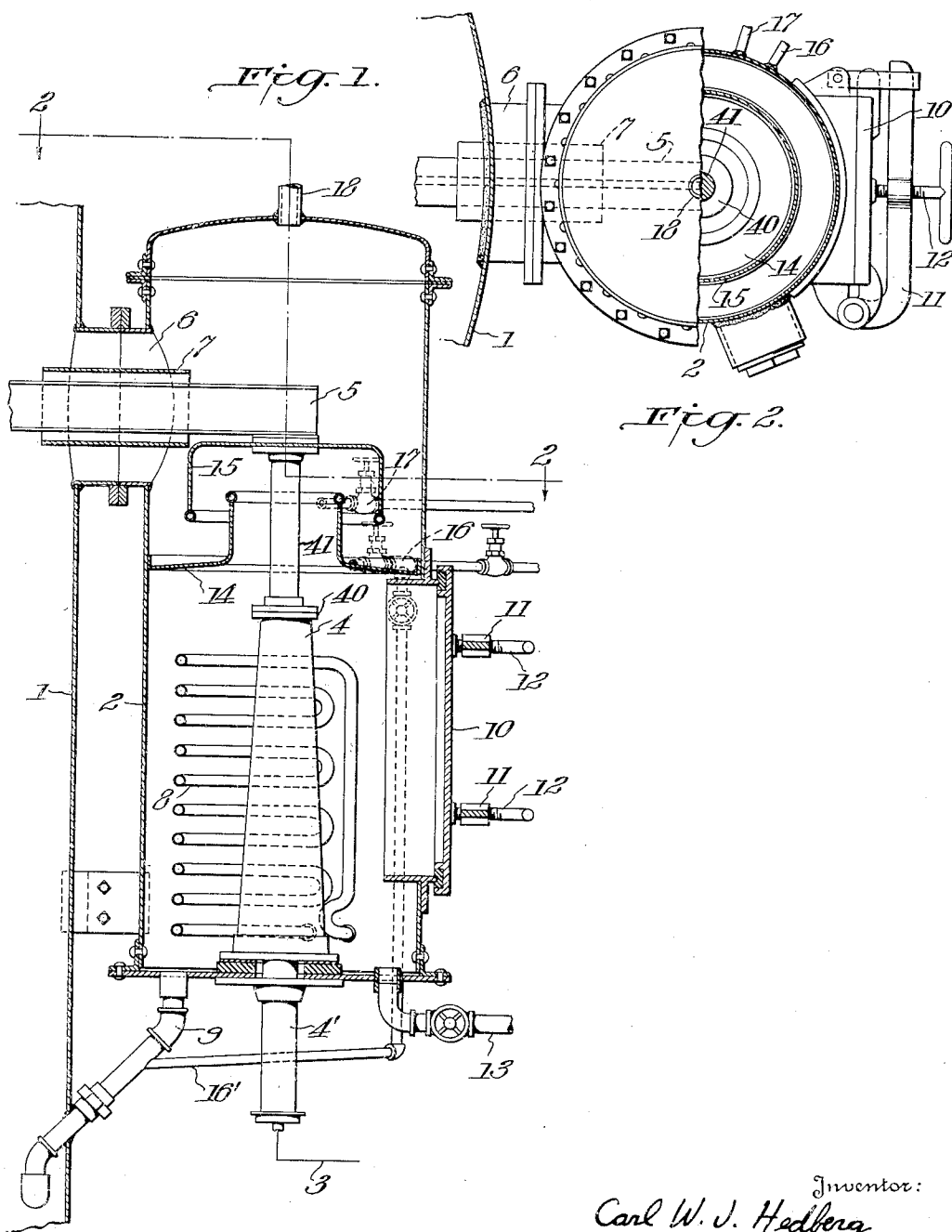
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INSULATOR COMPARTMENT

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INSULATOR COMPARTMENT

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This invention relates to an improvement in insulator compartments associated with electrical precipitator chambers, and is particularly directed to an improved method of inspecting and cleaning such insulator compartments and to an improved insulator compartment structure.

In electrical precipitators the discharge electrodes are generally at high tension, while the collecting electrodes and the precipitator structure as a whole are grounded. This necessitates the provision of high tension insulators for bringing the high tension conductors into the precipitator chambers. The insulators are commonly contained in protective housings forming compartments which are isolated from the main gas flow and are frequently heated in order to keep the insulators as dry as possible. In spite of these precautions the insulators require frequent cleaning and inspection, as the industrial gases treated by electrical precipitation are dirty and frequently saturated with water, acids or other liquids.

The provision of a liquid seal between the precipitator chamber and the insulator compartment is unsatisfactory. Such seals are difficult to maintain and add to the possibility of contaminating the insulator, particularly because of fluctuations in the pressure of the gas being treated which cause the liquid to slop out of the seal and also because the liquids rapidly become contaminated by the dirt and corrosive agents present in the gas being treated.

It has, therefore, been the general practice to provide free communication between the precipitator chamber and the insulator compartment. Whenever insulators associated with precipitators containing explosive or toxic gases require inspection or cleaning, it is necessary to purge out the entire precipitator chamber to avoid danger of explosion and harmful effects on the workmen. This procedure not only wastes all of the gas contained in the precipitator, but necessitates a considerable delay in the operation of the precipitator. Because of the relatively large size of the precipitator chambers the occasional formation of explosive mixtures is difficult to avoid.

It has now been found that these disadvantages may be eliminated by providing means for interrupting communication between the insulator compartment and the precipitator chamber, and when inspection or cleaning of the insulator compartments is desirable, interrupting the communication by the means provided, opening the insulator compartment to the air, and

conducting the inspection and cleaning without affecting the gases in the precipitator chamber. Before or after the insulator chamber is opened to the atmosphere it may be purged, for example, by blowing steam or carbon dioxide there-through.

Advantageously, members are provided which form a seal when supplied with liquid. The liquid is then added to form the seal whenever inspection is desired and the liquid is drained off after the insulator compartment is closed following the inspection.

An illustrative embodiment of the invention will be described with particular reference to the accompanying drawing, in which:

Fig. 1 is a sectional elevation of an insulator compartment embodying the principles of the invention; and

Fig. 2 is a plan, in partial section, on the line 2—2 of Fig. 1.

In the drawing, 1 is the shell of the precipitator chamber and 2 is the shell of the insulator compartment. High tension conductor 3 is brought into the compartment through insulating bushing 4, which projects within supporting insulator 4, and connects with bus bar 5, preferably utilizing a conductor, not shown, passing through the top of insulator 4 to flange 40 and metallic supporting member 41. Bus bar 5 supports discharge electrodes, not shown, within shell 1. The bus bar passes into the precipitator compartment through opening 6 and is surrounded at this point by a collar 7 to prevent corona discharges.

The insulator compartment is advantageously heated during operation, for example, by means of steam coil 8. The compartment is drained at 9. A hinged cover plate 10 is fastened by any convenient means, for example, by yokes 11 and bolts 12. An inlet conduit 13 is advantageously provided for the introduction of purging gases.

Attached to the upper portion of shell 2 is an annular cup member 14, and attached to the insulator or conductor is a circular curtain member 15 depending into the cup member. The cup member is provided with filling and draining connections at 16 and with an overflow outlet at 17. A vent 18 may be provided in the cover of the insulator compartment.

When it is desired to clean or repair an insulator in a compartment as described, valve means in the gas inlet and in the gas outlet of the precipitator are closed and the energizing current is shut off. The gas in shell 1 is then brought to approximately atmospheric pressure so that no

appreciable difference of pressure will exist across the liquid seal when door 10 is opened. This is accomplished by bleeding gas to atmosphere through a valve, not shown, on pipe 18, if the gas pressure in the shell at shut down is above atmospheric pressure. If the pressure in the shell is below atmospheric pressure, purging gas (which may be air, under some circumstances) is introduced through pipe 13 until the pressure within insulator compartment 2 and shell 1 is raised to that of the atmosphere. Gaseous communication between this compartment and the precipitator is cut off by running liquid into cup 14 through pipe 16 up to the overflow level. Door 10 may then be opened. After the gases in the insulator compartment have sufficiently diffused into the atmosphere, assisted, if desired, by means of a purging gas introduced through 13, the compartment may be inspected and cleaned and any necessary repairs made without danger of the leakage of gas into or out of the precipitator chamber. Thereafter the door 10 may be closed, the liquid drained out of cup 14 through pipe 16 and 16', and the precipitator again put into operation.

If the operating pressure of the gas in shell 1 is not more than, say, 2 inches of water above or below atmospheric, the seal can be filled with insulating liquid, the insulator compartment purged out, and door 10 can be opened for inspection of the insulator without stopping the gas flow or discontinuing the electrical treatment. Care must be taken, of course, to remain at a safe distance from members maintained at high potential and to purge effectively before opening door 10 and again after closing door 10 and before draining seal cup 14 if explosive gases are involved.

It will be seen that the new method of operation and construction of the invention provide a valuable improvement in the design and operation of electrical precipitation equipment and that the details of operation and design may be varied to a large extent, without departing from the principles of the invention.

I claim:

1. In association with an electrical precipitator chamber, an insulator compartment including a housing, a conductor mounted in an insulating bushing, means for shutting off gaseous communication between the insulator compartment and the chamber, and means for opening said compartment to the atmosphere for inspection and cleaning.

2. In association with an electrical precipitator chamber, an insulator compartment including a housing, a conductor mounted in an insulating

bushing, members carried by said housing and said conductor, respectively, providing a cup and curtain cooperating to seal the insulator compartment from the precipitator chamber when the cup contains a liquid, means for supplying liquid to said cup, means for draining liquid from said cup, means for passing a stream of purging gas into said compartment, and means for withdrawing the purging gas stream from said compartment.

3. In association with an electrical precipitator chamber, an insulator compartment including a housing, a conductor mounted in an insulating bushing, members carried by said housing and said conductor, respectively, providing a cup and curtain cooperating to seal the insulator compartment from the precipitator chamber when the cup contains a liquid, means for supplying liquid to said cup, means for draining liquid from said cup, and means for opening said compartment to the atmosphere for inspection and cleaning.

4. In association with an electrical precipitator chamber, an insulator compartment including a housing, a conductor mounted in an insulating bushing, a cup member carried by said housing and a curtain member carried by said conductor, said cup and curtain cooperating to seal the insulator compartment from the precipitator chamber when the cup contains a liquid, means for supplying liquid to said cup, means for draining liquid from said cup, means for passing a stream of purging gas into said compartment, and means for withdrawing the purging gas stream from said compartment.

5. In association with an electrical precipitator chamber, a housing forming an insulator compartment, an insulator mounted in said housing, electrode supporting means mounted on said insulator, means for shutting off gaseous communication between the insulator compartment and the chamber, and means for opening said compartment to the atmosphere for inspection and cleaning.

6. In association with an electrical precipitator chamber, an insulator compartment including a housing, a conductor mounted in an insulator, members carried by said housing and said conductor, respectively, providing a cup and curtain cooperating to seal the insulator compartment from the precipitator chamber when the cup contains a liquid, means for supplying liquid to said cup, means for draining liquid from said cup, means for passing a stream of purging gas into said compartment, and means for withdrawing the purging gas stream from said compartment.

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