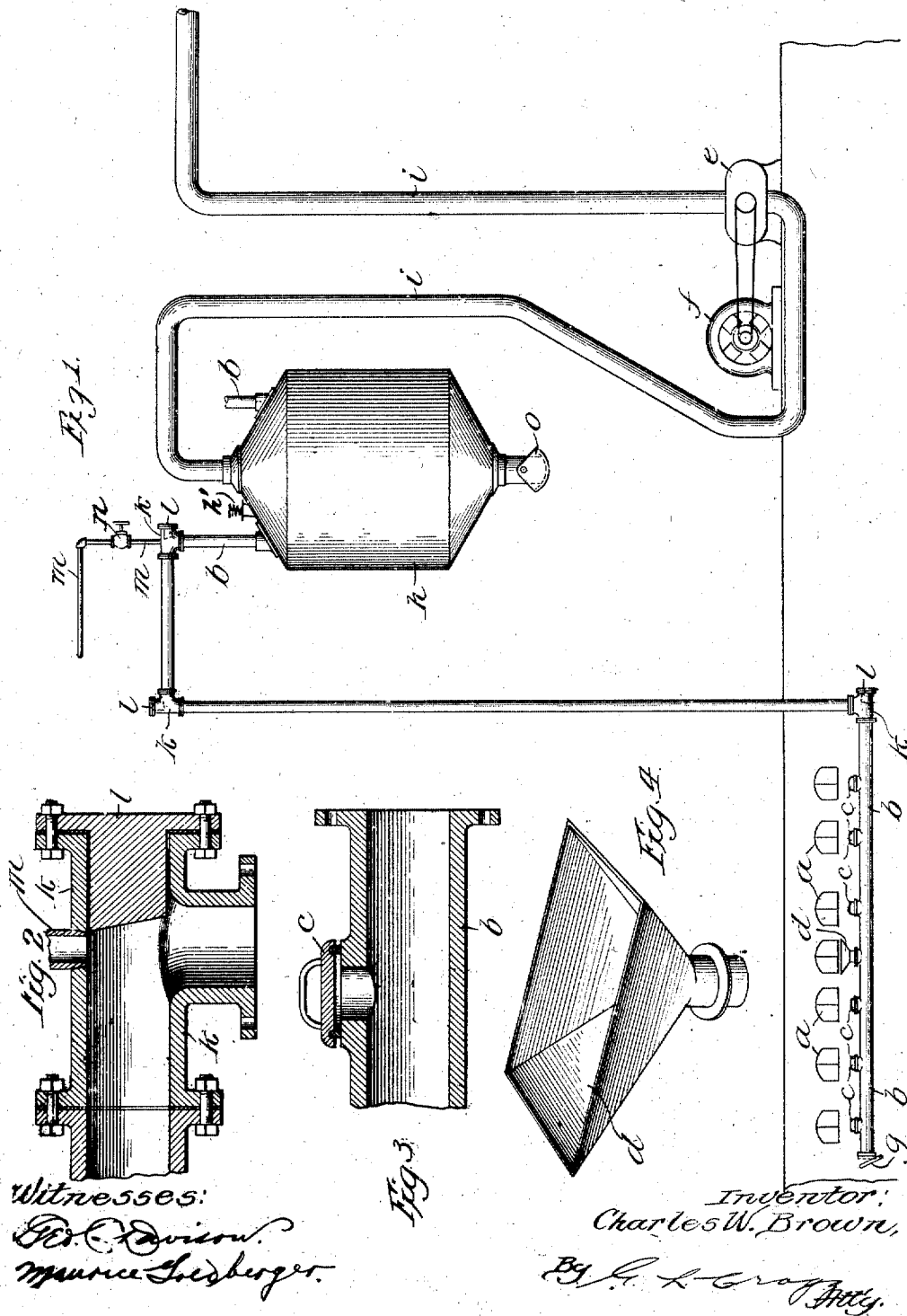


C. W. BROWN.
PNEUMATIC CONVEYING APPARATUS.
APPLICATION FILED JULY 28, 1910.

984,188.

Patented Feb. 14, 1911.



UNITED STATES PATENT OFFICE.

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Specification of Letters Patent. Patented Feb. 14, 1911.

Application filed June 28, 1910. Serial No. 569,304.

To all whom it may concern:

Be it known that I, CHARLES W. BROWN, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pneumatic Conveying Apparatus, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to pneumatic conveying apparatus or systems and is of particular service in conveying dust, ashes, or other small particles.

My invention has for one of its objects the provision of means for so thoroughly mixing dust or ashes with water while still in the pipe through which they are conducted to a separator that, because of this thorough mixture and because of the reduced velocity in the separator, they will settle to the bottom of the separator and allow a substantially pure current of air to pass on. In accomplishing this result, I preferably employ sharp bends in the dust conducting pipe and introduce the water for wetting the dust at one of these bends, preferably the last one before entering the separator, the sudden change in direction of the current of air and dust at each bend serving to mix them most thoroughly with each other so that at the last bend the dust will be thoroughly wetted by the water because of the previous thorough mixing of the air and dust at previous bends and because of the violent agitation of this mixture and the water at the bend where the water is admitted. As a consequence of the thoroughness of the mixture of the dust and water, I am enabled to use a separator consisting of merely a large receptacle which may be free of internal apparatus, the reduction in velocity of the current of air and wet dust being amply sufficient to allow all the wet dust to settle to the bottom of the separator.

I will explain my invention more fully by reference to the accompanying drawing showing the preferred embodiment thereof, in which—

Figure 1 is a diagrammatic view illustrating my apparatus including the features of my invention; Fig. 2 is a detail longitudinal sectional view of one of the bends in the conveying pipe, a water pipe for supplying water to the conveyed material being also shown; Fig. 3 is a detail longitudinal sec-

tional view of a short portion of the conveying pipe at a point immediately in front of an ash pit door; and Fig. 4 is a detail perspective view of a funnel used in guiding ashes from an ash pit door through an opening in the conveying pipe.

Like parts are indicated by similar characters of reference throughout the different figures.

I have illustrated the preferred embodiment of my invention as adapted specifically to an apparatus for removing ashes from a furnace room. Conveniently near the ash pit doors *a* extends a horizontal pipe *b* for receiving the ashes, this pipe, in the preferred arrangement, extending immediately in front of and below the line of ash pit doors. Under each door is an opening into said pipe, said opening having a removable closure *c* which may be removed to allow ashes to be raked into the pipe. For convenience, a funnel *d* is preferably provided of such design that when resting over one of the pipe openings, it will guide ashes raked from the associate ash pit door into the pipe, through which pipe the ashes are removed by a strong current of air produced by the blower *e* of any suitable design, driven by the motor *f*. The left hand end of the pipe *b* is open when the system is in operation in order that air may freely enter the pipe so that the blower may give the necessary strong draft.

While I have shown in full but one line of ash or material collecting piping, I do not wish to be limited to the number of such lines, and when more than one line is present, each of those not in use may have its open end closed as by a hinged plate *g* and its closures *c* in place over the openings under the ash pit doors, in order that the draft in a line of piping in use may be as strong as possible. The ashes are carried by the draft of air through the piping *b* to the top of the separator *h* which is preferably merely a large empty receptacle free of internal apparatus, in which receptacle the ashes are collected, the air passing on out of the top of this receptacle through the pipe *i*, at some convenient intermediate portion of which is located the blower *e*. At each bend in the line of ash or material carrying piping *b* is a fitting *k* in the form of a T embodying novel features of my invention as preferably constructed.

Directly in line with the incoming current

of air and material is the replaceable plug or filler *l* of suitable heavy imperforate wear resisting refractory material such as chilled cast iron, said plug or filler serving to receive the impact and therefore the wear due to the particles of material as their direction of motion is changed at the bend, and serving further to insure a breakage of the larger clinkers or objects, that would otherwise serve to reduce air pressure, and a thorough mixture of the air and material at each bend before entering the separator *h* in order that a stream of water introduced at the last bend through the water pipe *m* may thoroughly wet the material. The portions of the piping between and at the sharp bends are guarded against undue wear by the flowing material since this flowing material is so evenly distributed in the flowing column of air, the friction between the piping and the outer surface of the flowing column of air and material causing a reduction in speed of such outer surface, this outer surface thereby guarding the interior of the piping against the more rapidly moving particles passing through such outer surface of the moving air column. The water pipe *m* is provided with a valve *n* to regulate the amount of water used in wetting the conveyed material or ashes.

As I have shown my invention the turn in the pipe at each fitting *k* is so abrupt as to furnish such impediment to the progress of the solid matter through the piping as practically to stop the flow of the solid particles at each fitting when they have passed through one length of piping and are on the point of commencing their passage through a contiguous length of piping. The air, however, does not have its speed materially reduced at the fittings, but owing to the sharp bends the air is caused to swirl and travel in eddies. Owing to the practical stoppage of the solid particles at the fittings, the air continuing at its practically undiminished speed and swirling and flowing in eddy currents at the fittings has opportunity thoroughly to become mixed with the solid particles at the fittings before these solid particles resume their passage through the piping. At the final bend *k* of the piping water is added to the air and the solid particles that are there undergoing mixture in the manner which has been described whereby the lighter particles are moistened and are thereby readily separated from the air so that the air and particles when received in the separator *h* may readily be separated without the necessity of employing complicated mechanism within the separator, though I do not wish to be limited to the character of the separator. The capacity of the separator *h* is such that the ve-

locity of the air, conveyed material and water is sufficiently reduced to insure the settling of practically all the wet material to the bottom of the separator, or in other words to insure that a substantially pure current of air will emerge from said separator through the exhaust pipe *i*. The bottom of the separator is provided with a closure *o* covering an opening through which the collected material may be drawn into a car, wagon or other receptacle placed underneath. The wet material at the closure *o* may, if desired, be employed to form a sufficiently good air seal at said closure to prevent interference with the proper exhaustion of the separator by the blower. A safety valve *h'* will operate to admit air in the event of excessive vacuum.

While I have herein shown and particularly described the preferred embodiment of my invention and one use to which it may be particularly applied, I do not wish to be limited to the precise details of construction shown nor do I wish to be limited to the use specifically mentioned, as changes may readily be made without departing from the spirit of the invention, but,

Having thus described my invention, I claim as new and desire to secure by Letters Patent the following:—

1. A pneumatic conveying apparatus, including angularly related lengths of conveying piping; a T-fitting uniting said lengths of piping; and a filler of imperforate wear resisting refractory material in the third opening of the T-fitting and constituting an abutment facing the direction of motion of the conveyed material in the incoming length of piping.

2. A pneumatic conveying apparatus including conveying piping having a sharp bend therein; a separator to which the piping leads; means for effecting forced passage of air through the piping toward the separator whereby material may be conveyed through the piping toward the separator, the progress of the material through the piping being arrested at the sharp bend in order to allow the moving air thoroughly to become intermixed at the bend with the material; and means for introducing water at the bend where the thorough intermixture of air and material occurs whereby the lighter particles of the material are saturated to facilitate their separation from the air in the separator.

In witness whereof, I hereunto subscribe my name this 27th day of June, A. D., 1910.

CHARLES W. BROWN.

Witnesses:

G. L. CRAGG,

R. E. ATHERTON.