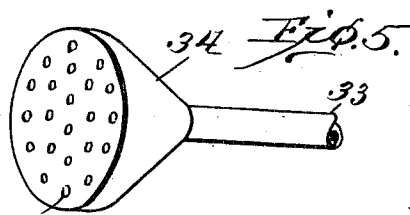
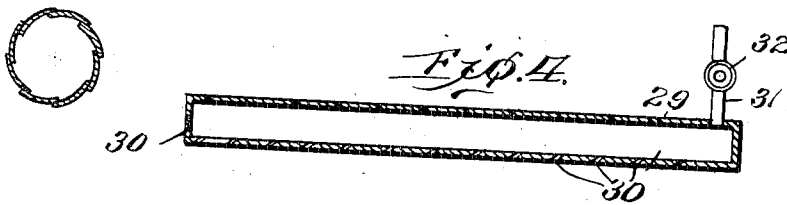
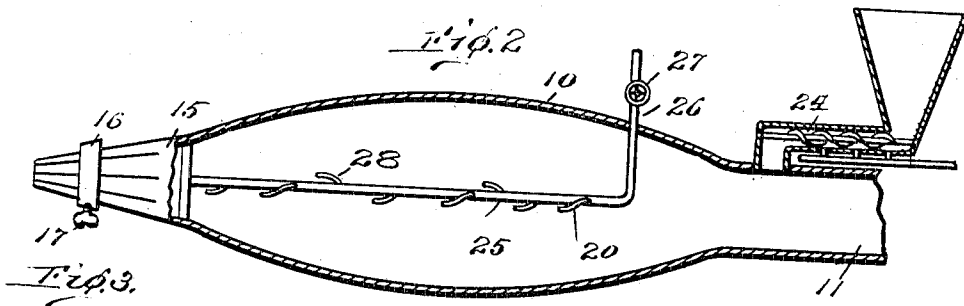
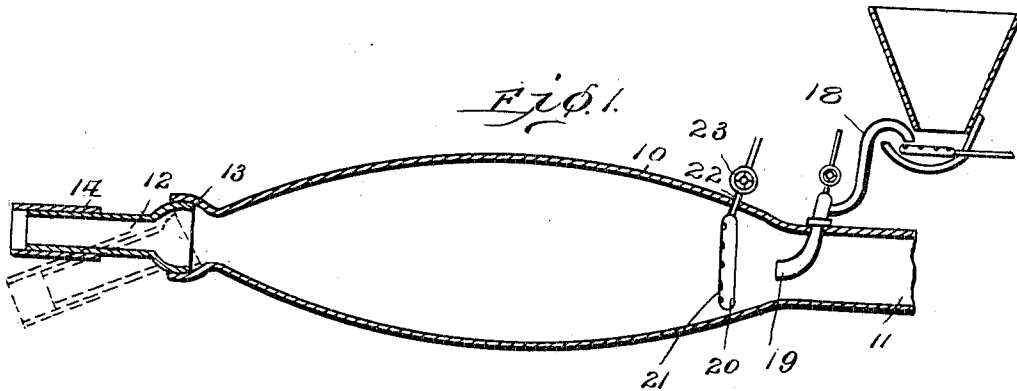


H. B. PRUDEN.
MIXER FOR COMMINUTED MATERIAL.
APPLICATION FILED MAR. 5, 1914.

1,120,535.

Patented Dec. 8, 1914.
2 SHEETS—SHEET 1.



Witnesses
J. M. Fowler
Howard A. Coombs

Inventor
H. B. Pruden

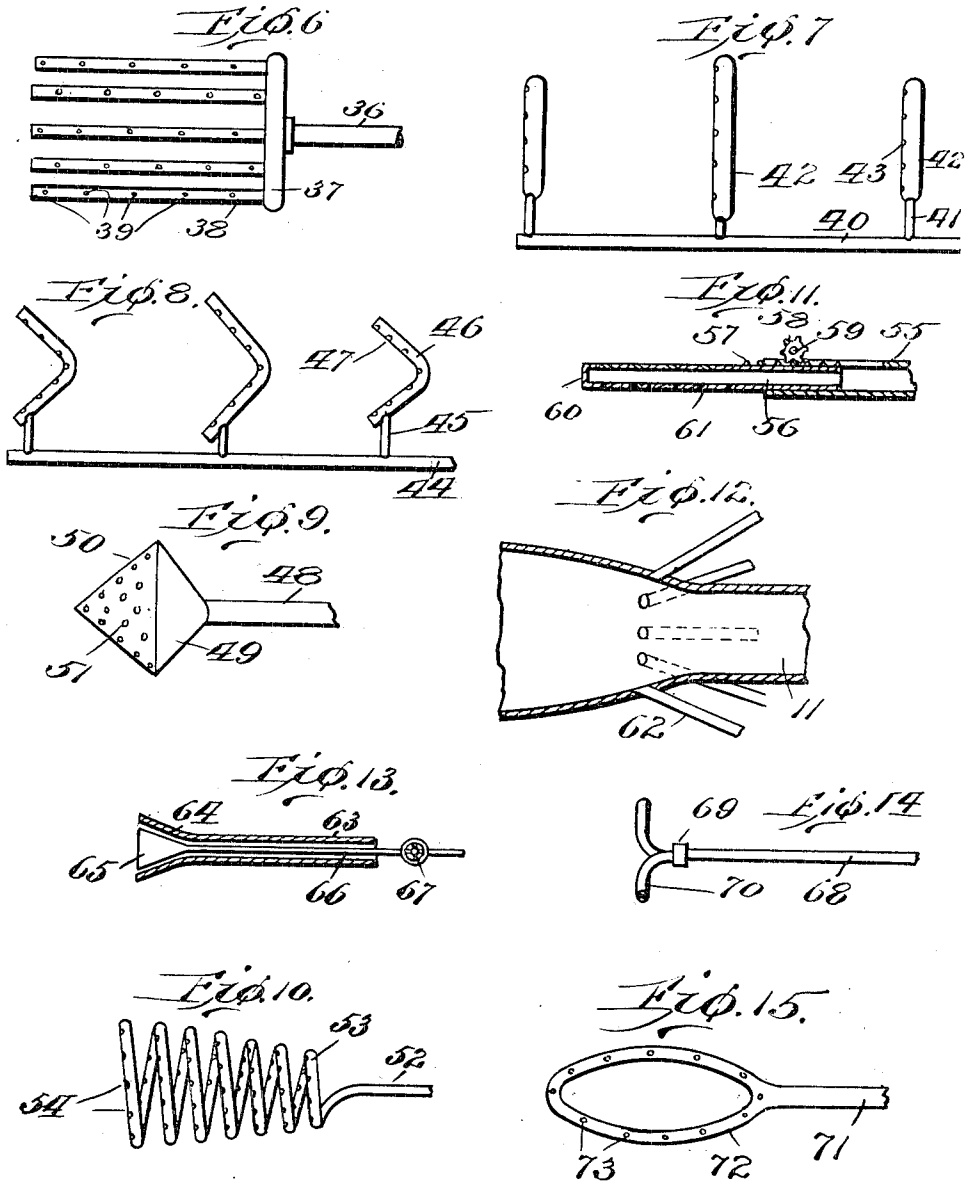
By *Geo. Hayden* Attorney

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2 SHEETS-SHEET 2.



Witnesses

J. M. Fowler Jr.
Howard A. Corbin

Inventor

H. B. Pruden

By

W. H. Snyder Attorney

UNITED STATES PATENT OFFICE.

HARRY B. PRUDEN, OF NEW CASTLE, PENNSYLVANIA.

MIXER FOR COMMINUTED MATERIAL.

1,120,535.

Specification of Letters Patent.

Patented Dec. 8, 1914.

Application filed March 5, 1914. Serial No. 822,679.

To all whom it may concern:

Be it known that I, HARRY B. PRUDEN, a citizen of the United States, residing at New Castle, in the county of Lawrence and State of Pennsylvania, have invented certain new and useful Improvements in Mixers for Comminuted Material, of which the following is a specification.

This invention relates to apparatus for feeding comminuted material and forms a companion for my co-pending application bearing the Serial No. 821,787 and filed February 28th, 1914.

The principal object of the invention is to provide for an improved distribution of air in the mixing chamber in such a device.

A second object of the invention is to provide an improved nozzle means in connection with such a device.

With the above and other objects in view the invention consists in general of certain novel details of construction and combination of parts hereinafter fully described, illustrated in the accompanying drawings, and specifically claimed.

In the accompanying drawings, like characters of reference indicate like parts in the several views, and:—

Figure 1 is a longitudinal section taken through a mixing device showing one form of the invention. Fig. 2 is a view similar to Fig. 1, but showing a second form of the invention. Fig. 3 is a detail view taken through the nozzle shown in Fig. 2, the section being taken on the line 3—3 of said figure. Fig. 4 is a modified form of type for the delivery of air adapted for use with either of the forms of the invention here shown. Fig. 5 is a second modification of such a pipe. Figs. 6 to 10 are other modifications of such a pipe. Fig. 11 is a view showing an extensible pipe, adapted for use herewith. Fig. 12 is a view of a casing having a multiplicity of pipes, the view being a modification of the device shown in Fig. 1. Fig. 13 is another modification of air delivery pipe showing valve means used in connection therewith. Fig. 14 is a view showing a device arranged for turbine delivery of air. Fig. 15 is a detail view of the delivery ring shown in Fig. 1.

In carrying out the objects of this invention there is provided a casing 10 of spindle shape but truncated at each end. At one

end of this casing is a low pressure air inlet pipe 11 while at the other end thereof there is provided a suitable nozzle. In the form shown in Fig. 1 the nozzle is indicated as a cylindrical pipe 12 which is connected with the casing 10 by means of a ball and socket joint 13 so that the nozzle may be moved from one position to the other as indicated in full and dotted lines in said figure. Moreover this nozzle has provided thereon an extensible sleeve 14.

In the form of the device shown in Fig. 2 there is provided a nozzle 15 of elastic material which is split to form a frusto-conical structure, the split portions overlapping each other as clearly shown in Fig. 3. Mounted on the split nozzle is a ring 16 which is held securely in position by means of a set screw 17. But by moving the ring longitudinally of the nozzle the delivery end of the nozzle may be increased or diminished in size at will.

In the form shown in Fig. 1 there is disclosed a vacuum delivery device which is indicated in general at 18, the device being the same as that shown in the co-pending patent above referred to. This delivery device terminates in an axially disposed nozzle 19 and spaced in advance of this nozzle is a ring of pipe indicated at 20 and provided with suitable openings 21 facing the nozzle 12. This ring of pipe is supported by and supplied with air through a high pressure air pipe 22 which is controlled by a suitable valve 23. Thus when the material, such as fine coal or the like, issues from the nozzle 19 it will be blown out through the influence of the low pressure blast 11 through the ring 20. There the high pressure blast issuing from the openings 21 will mix up the comminuted material with the air and deliver it to the nozzle in the form of a cloud of uniform density.

In the form shown in Fig. 2 there is provided a gravity device, similar to that shown in my co-pending patent and indicated in general at 24. This gravity delivery device is arranged to deliver material into the tubes 11 from whence it is blown into the casing 10 by the air passing through said tube. Extending axially of the casing 10 is a tube 25 which is connected to a supply pipe 26 provided with a valve 27, the supply pipe being furnished with air from a high pres-

sure source. Spirally arranged around the tube 25 are forwardly inclined nozzles 28 which serve to mix up the air and dust in the casing 10 and deliver it through the nozzle 15.

In the form of supply pipe shown in Fig. 4 there is provided a simple cylindrical pipe 29 which is closed at its rear end and provided at its front end with a perforated diaphragm 30. Furthermore this pipe is provided with a spiral series of forwardly inclined openings 31 which act in substantially the same manner as the nozzle 28. This pipe is connected to the usual supply pipe 31' provided with a valve 32.

In the form shown in Fig. 5 a simple straight pipe 33 is used which carries at its forward end a frusto-conical spreader 34 which is so arranged that the mixture, under low pressure, will flow around this end without interruption. The face of this frusto-conical end is provided with a multiplicity of openings 35 for the delivery of high pressure air which thus mixes the material and the air thoroughly.

In the form of the device shown in Fig. 6 there is provided a main supply pipe 36 which is connected to an annular spreader 37 from whence extend pipes 38 parallel to the axis of the casing 10. These pipes 38 are each provided with a multiplicity of openings 39 preferably spirally arranged so that when material is blown around the annular spreader 37 a thorough mixture is made thereof.

In the form shown in Fig. 7 the supply pipe for the high pressure air is extended along one side of the casing, such a supply pipe being indicated at 40. From this supply pipe extend branches 41 and each of these branches is connected to an annular pipe 42 provided with openings 43 arranged to face the delivery end of nozzle of the casing. Thus after the mixture receives agitation from the first of these annular pipes 42 it in succession receives agitation from each succeeding pipe.

In the form shown in Fig. 8 there is provided a main high pressure air pipe 44 which extends along the casing similar to the pipe 40. This main supply pipe has lateral branches 45 and on each of these branches is provided a V-shaped pipe 46, the apex of the V being directed rearwardly, and the inner side of this V-shaped pipe being provided with openings 47 so that these pipes act in a manner similar to the pipes 42.

The form of the device shown in Fig. 9 is a modification of the form shown in Fig. 5 but in this form of the device the supply pipe 48 is connected to a frusto-conical head or end 49 but in place of a flat base this frusto-conical head is connected to a conical nozzle 50, the bases of the frusto-cones and

nozzle being adjacent. This frusto-conical nozzle is provided with a series of openings 51 so that the material flowing past the head 49 is thoroughly mixed by the air issuing from the nozzles 51.

In the form shown in Fig. 10 there is provided a delivery pipe 52 which is arranged axially of the casing and this pipe terminates forwardly in an increasing spiral pipe 53 provided with forwardly directed openings 54. Thus when the material is delivered into this casing from the delivery nozzle 19 it is successively agitated by the air issuing from the openings in the different barrels.

In the form shown in Fig. 11 there is provided a high pressure delivery pipe 55 wherein slides a nozzle 56 provided on one side with a rack 57. Meshing with this rack 57 is a gear 58 which is actuated from a suitable shaft 59 arranged to extend through the side of the casing and having actuating means on the exterior thereof. This nozzle 56 is closed at its forward end as indicated at 60 and is provided with a series of forwardly directed openings 61 so that it operates in a manner similar to the pipe 29 with the exception that it can be adjusted so that the proper mixture can at all times be obtained.

In the form shown in Fig. 12 the casing 10 has surrounding its inlet end a series of pipes 62 which thus form a rose around said end, said pipes all being inclined toward the center and forwardly of said casing. Thus when the mixture is blown in through the pipe 11 the air issuing from the pipe 62 serves to thoroughly mix the comminuted material and air.

In the form shown in Fig. 13 there is provided a delivery pipe 63 which has its forward end flared as at 64. In this forward end is a conical valve 65 which is connected to a valve stem 66 arranged to be operated by a suitable operating wheel 67.

In the form shown in Fig. 14 there is provided a centrally disposed high pressure pipe 68 which carries on its outer end a revoluble member 69 having air tight connection with the pipe 68. From the member 69 extends the branch pipes 70 each of which is curved outwardly so as to form the Hero's engine. Thus when air is delivered through the pipe 68 the branch pipes 70 revolve rapidly and distribute the air spirally, the air being forced forward by the air entering through the tube 11.

In the form shown in Fig. 15 there is provided a pipe 71 which extends axially of the casing and to the end of this pipe is connected an oval ring pipe 72 provided with forwardly directed openings 73, the longer axis of the oval extending axially of the casing so that as the material passes through the casing under the influence of the blast

from the pipe 11 the high pressure air issuing from the opening 17 thoroughly mixes the same.

Having thus described the invention, what is claimed as new, is:—

1. In a device for mixing comminuted material, a casing, separate means to feed air and comminuted material into said casing, a high pressure air pipe extending into said casing, and a delivery pipe connected to said pipe and having uniformly spaced openings therein directed toward the outlet end of the casing.

2. In a device for mixing comminuted material, a casing, separate means to feed air and comminuted material into said casing, a high pressure air pipe extending into said casing, a delivery pipe connected to said pipe and having uniformly spaced openings therein directed toward the outlet end of the casing, and a delivery pipe connected to each of said openings.

3. In a device for mixing comminuted material, a casing, separate means to feed air and comminuted material into said cas-

ing, a high pressure air pipe extending into said casing, a delivery pipe connected to said pipe and having uniformly spaced, forwardly directed openings, and a delivery pipe connected to each of said openings, each of said delivery pipes being provided with a series of uniformly spaced openings.

4. In a device for mixing comminuted material, a casing, separate means to feed air and comminuted material into said casing, a high pressure air pipe extending into said casing, an annular delivery pipe connected to the air pipe and having forwardly directed openings, and delivery pipes connected to said openings and extending forwardly from the annular pipe, said delivery pipes being provided with spaced openings.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY B. PRUDEN.

Witnesses:

FRANCIS S. MAGUIRE,
GEO. H. SNYDER.