

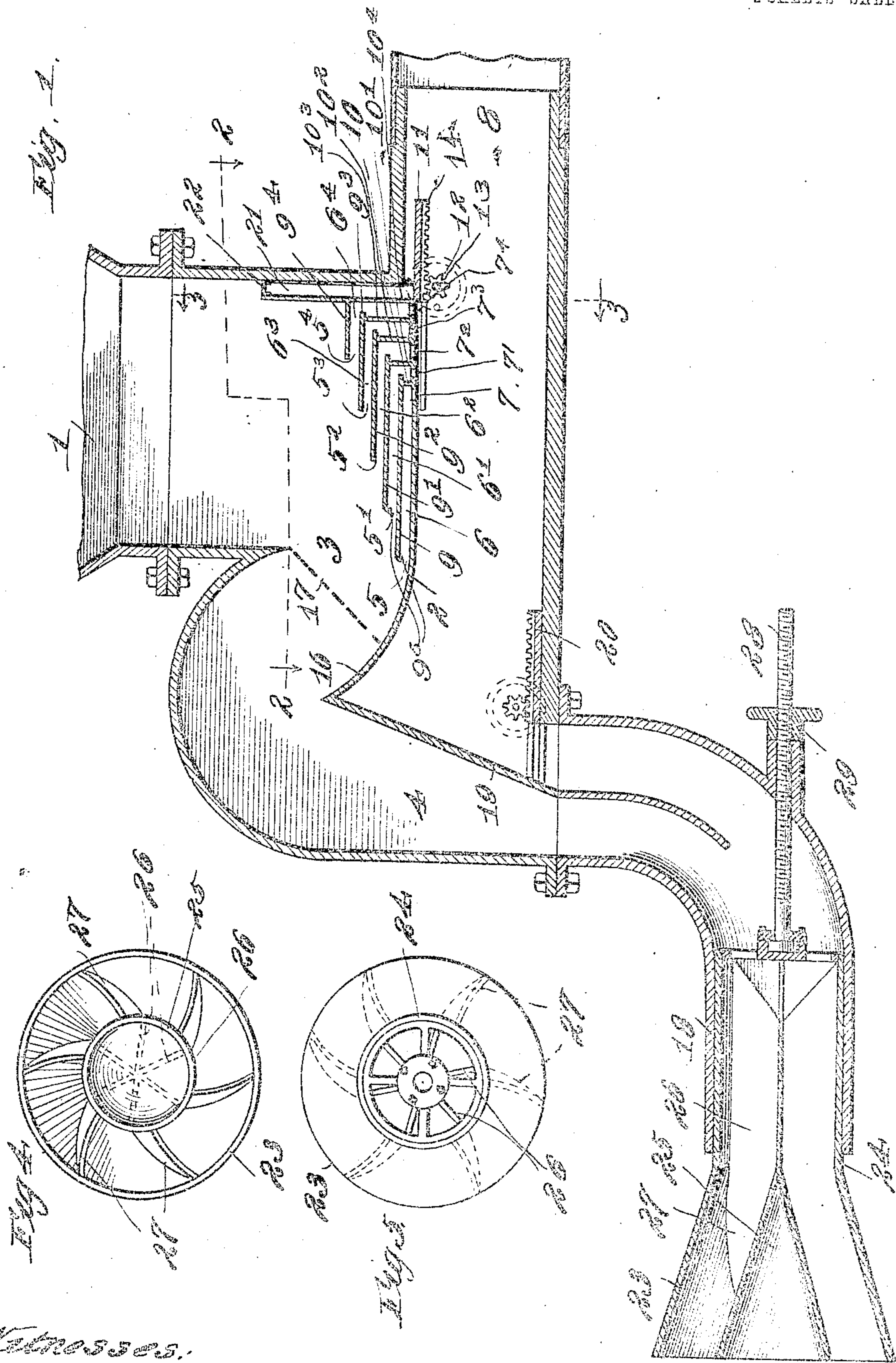
PNEUMATIC FEEDER.

APPLICATION FILED JULY 24, 1908.

930,127.

Patented Aug. 3, 1909.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 2.

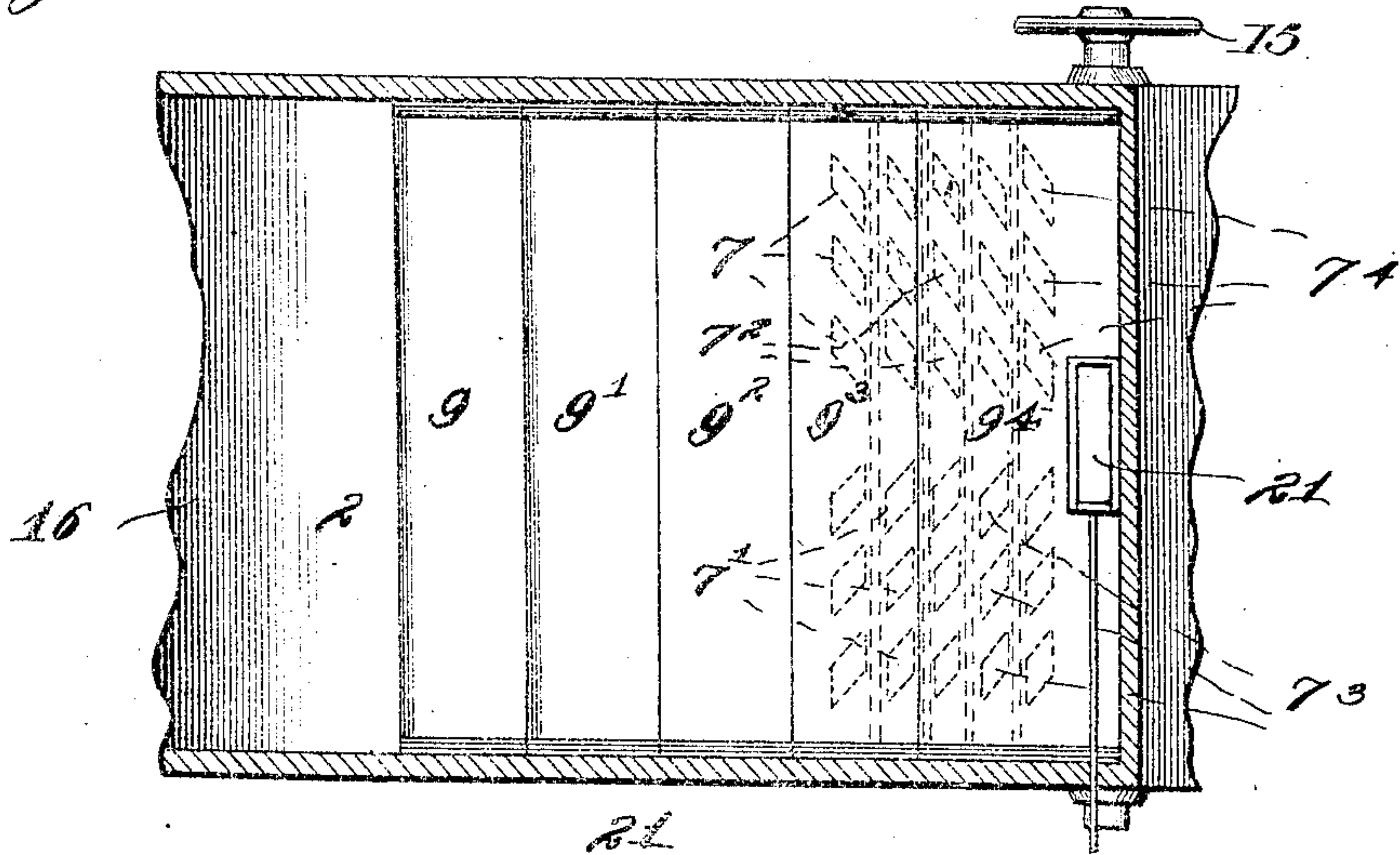
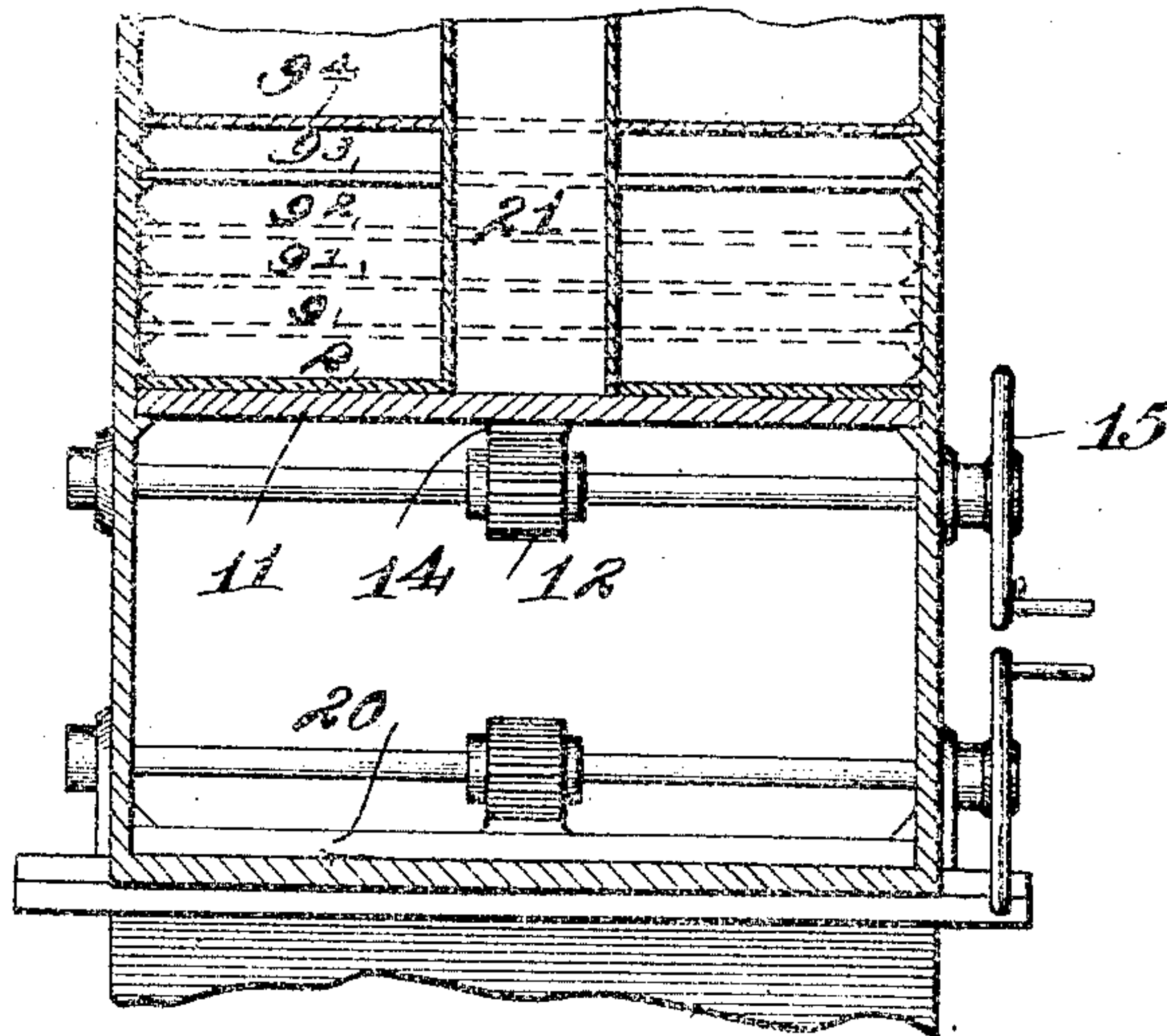


Fig. 3.



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UNITED STATES PATENT OFFICE.

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PNEUMATIC FEEDER.

No. 930,127.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWIN M. BASSLER, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pneumatic Feeders, of which the following is a specification.

This invention relates to devices for feeding pulverized material and relates particularly to pneumatic feeders especially designed and adapted for feeding pulverized coal, coke, sawdust, shavings, grain and the like, of the general type shown and described in U. S. Letters Patent No. 724,780, dated April 7, 1903.

The object of the invention is to improve feeders of this general type in certain important particulars; to prevent the same from becoming choked and clogged and thus to render them more uniform and certain in their operation; and to provide for effectively diffusing the pulverized material at the point of use, as within a furnace, the fire box of a boiler or in a kiln; whereby a commercially practical apparatus for the designed purpose is provided.

To effect these objects, my invention consists of the various features, combinations of features and details of construction herein-after described and claimed.

In the accompanying drawings, in which my invention is fully illustrated—Figure 1 is a vertical, longitudinal, sectional view of a feeder of my invention. Fig. 2 is a plan section taken substantially on the line 2—2 of Fig. 1, on an enlarged scale. Fig. 3 is a sectional elevation, on an enlarged scale, on the line 3—3 of Fig. 1. Fig. 4 is a front end view of the mouth-piece or nozzle at the end of the discharge pipe from the feeder; and Fig. 5 is a rear end view of said mouth-piece.

My improved feeder comprises a suitable receptacle, as a hopper 1, for containing the material to be fed thereby, as pulverized coal or the like. The lower end of the hopper 1 is closed by a plate 2 and communicates by means of a lateral opening 3, with a discharge flue or passageway 4, which conducts to the point of use, as a boiler furnace, kiln or the like, not shown.

The pulverized material contained in the hopper 1, as coal, or the like, is adapted to be discharged therefrom into the flue or passageway 4 by jets of fluid under pressure,

preferably air, directed along the bottom of the hopper 1 from nozzles or jet orifices 5, 5¹, 5², 5³ and 5⁴. As shown, the nozzles or jet orifices 5, 5¹, 5², 5³ and 5⁴ form the discharge openings from passageways 6, 6¹, 6², 6³ and 6⁴, the opposite ends of which communicate by means of ports 7, 7¹, 7², 7³ and 7⁴ with a pipe 8 which, in turn, communicates with a source of supply of fluid under pressure, as a fan or blower, not shown.

The passageways 6, 6¹, 6², 6³ and 6⁴ are formed by suitable plates 9, 9¹, 9², 9³ and 9⁴, and 10, 10¹, 10², 10³ and 10⁴, which preferably extend transversely entirely across the lower end of the hopper 1, the lowermost plate 9 terminating substantially on a line with the opening 3 and the others at successively greater distances therefrom, so that the nozzles or jet orifices 5, 5¹, 5², 5³ and 5⁴ will form a series extending from said opening 3 rearwardly.

To provide for a fine control or regulation of the blast from said nozzles or jet orifices 5, 5¹, 5², 5³ and 5⁴ and thus of the feed, they comprise nozzles graduated in size, the bottom nozzle or jet orifice, 5, being the smallest and the upper nozzles or jet orifices larger, a desirable graduation being from about $\frac{1}{8}$ " at the bottom to about $\frac{1}{2}$ " at the top. In order to avoid undue contraction of the passageways having the small jet orifices, said passageways are made of the same width as the others and the nozzles contracted by bending down the end of the lower plates, as shown at 9⁵.

The ports 7, 7¹, 7², 7³ and 7⁴ are formed in the rearward end of the plate 2, which is flat, and are controlled by a damper 11 adapted to slide in suitable guideways formed in the side walls of the fluid pressure pipe 8 so as to be movable to open and close said ports successively and in series, thus providing for the finest possible adjustment of the feeding jets and of the feed, from zero, to the full capacity of the feeder. As shown, the damper 11 is adapted to be operated by means of a pinion 12 mounted on a shaft 13, mounted in suitable bearings in the side walls of the fluid pressure pipe 8, and engaging a rack 14 on the damper 11. Rotation is adapted to be imparted to the shaft 13 by means of a hand wheel 15, or the like, secured to an end thereof projecting through the side of the pipe 8.

To prevent the pulverized material from falling by gravity from the hopper into the discharge flue or passage 4, the bottom plate 2 of the hopper 1 is preferably extended 5 through the opening 3, the end thereof being preferably turned or bent up, as shown at 16, the relation being such that the extreme end of said hopper bottom 2 will be beyond the line of the natural inclination of the unsupported body of pulverized material 10 through the hole or opening 3, which is indicated approximately by the dotted line 17, Fig. 1.

To furnish the necessary amount of air to 15 effect combustion of the pulverized fuel and also a better vehicle therefor to the point of use, the flue or passageway 4 communicates with a pipe 18, which communicates with a source of supply of air under pressure, not 20 shown. As shown, said pipe 18 forms a continuation of the fluid pressure pipe 8, said fluid pressure pipe 8 and said discharge pipe 4 merging into said discharge pipe 18 at a point beyond the hopper 1.

25 As shown, the receptacle 1, passageway 4 and fluid pressure pipe 8 form substantially a unitary structure divided by the hopper bottom 2 and a partition 19, extending from the end of the hopper bottom to form said flue or 30 passageway 4 and a continuation of the pipe 8. At a point a distance from the opening 3, the partition 19 terminates and said flue or passageway 4 and said air passage merge into the discharge pipe 18. The quantity of air 35 entering said pipe 18 directly from the pipe 8 may be regulated as desired by means of a damper 20, which, as regards its construction and operation, is substantially a duplicate of the damper 11, heretofore described and will 40 be readily understood by reference thereto.

To prevent "bridging" of the pulverized material in the hopper 1, I provide a pipe 21, which, as shown, extends upward from the fluid pressure pipe 8 into the lower end of 45 said hopper to a point substantially even with the top of the hole or opening 3. The blast of air from said pipe 21 will operate to break down the material in the receptacle 1 and thus to prevent "bridging" thereof, or, 50 in case it should become "bridged," will break down the bridge as soon as said blast or jet is turned on. As shown, said pipe 21 is provided with a gate valve 22, designed to be kept normally closed and to be opened 55 only in case a "bridge" forms. My invention, however, contemplates equally the omission of said gate valve 22, whereby said pipe is at all times adapted to discharge a blast of air or other fluid into said hopper, 60 thereby effectually preventing all tendency of the material in the hopper to "bridge." When used, the gate valve 22 is preferably located closely adjacent to the upper end of the pipe 21, so as to prevent the pulverized

material from entering the same, which 65 might clog and obstruct the same and thus render it ineffective for its designed purpose.

To provide for diffusing the blast and thus the flame and heat from my improved feeder at the point of use, a suitable nozzle is provided at the end of the discharge pipe 18. 70 As shown, said nozzle consists of a flared mouth-piece 23 formed at the end of a pipe section 24 adapted to fit closely into the end of the discharge pipe 18; said pipe section 24 75 being preferably of sufficient length to provide for adjusting said nozzle lengthwise, a desirable adjustment for ordinary purposes being about one foot. Secured in the flared 80 mouth-piece 23 of said nozzle with its small end inwardly, is a cone 25. Preferably, also, means are provided in connection with said discharge nozzle for imparting to the blast therefrom a spiral or whirling motion. As 85 shown, this is effected by means of vanes 26 on the interior of said nozzle, which comprise inclined or curved end portions 27 at the discharge end of said nozzle. As shown, also, said vanes 26 provide means for supporting the cone 25. 90

My invention contemplates any desired or approved means for effecting longitudinal adjustment of said nozzle. As shown, said means comprise a screw threaded rod 28 connected to the rear end of the pipe section 24. 95 Said rod 28 extends rearwardly from said nozzle, being preferably in axial alinement therewith, and projects through a hole in the side of the discharge pipe 18 and threaded to the end of said rod outside of said pipe 18 is a 100 nut 29, said nut being preferably made in the form of a hand wheel to provide for conveniently operating the same.

I claim:—

1. In a device for feeding pulverized material, a suitable receptacle, a pipe adapted for connection with a source of supply of fluid under pressure and a discharge flue from said receptacle, said feeding device being provided with passageways communicating with said fluid pressure pipe and leading into said receptacle and terminating in jet orifices directed across said receptacle adjacent to the bottom thereof into the opening to the discharge flue, and means for 115 breaking down the material in said receptacle to prevent "bridging" thereof, said means consisting of a jet of fluid under pressure directed into said receptacle above the jet orifices for feeding the material from said 120 receptacle into said discharge flue.

2. In a device for feeding pulverized material, a suitable receptacle, a pipe adapted for connection with a source of supply of fluid under pressure and a discharge flue 125 from said receptacle, said feeding device being provided with passageways communicating with said fluid pressure pipe and lead-

ing into said receptacle and terminating in jet orifices directed across said receptacle adjacent to the bottom thereof into the opening to the discharge flue, and means for breaking down the material in said receptacle to prevent "bridging" thereof, said means consisting of a jet of fluid under pressure directed upwardly into the lower end of said receptacle.

3. In a device for feeding pulverized material, a suitable receptacle, a pipe adapted for connection with a source of supply of fluid under pressure and a discharge flue from said receptacle, said feeding device being provided with passageways communicating with said fluid pressure pipe and leading into said receptacle and terminating in jet orifices directed across said receptacle adjacent to the bottom thereof into the opening to the discharge flue, means for breaking down the material in said receptacle to prevent "bridging" thereof, said means consisting of a jet of fluid under pressure directed into said receptacle above the jet orifices for feeding the material from said receptacle into said discharge flue, and a valve which controls said jet.

4. In a device for feeding pulverized material, a suitable receptacle, a pipe adapted for connection with a source of supply of fluid under pressure, and a discharge flue from said receptacle, said feeding device being provided with passageways communicating with said pipe and leading into said receptacle and terminating in jet orifices directed across said receptacle adjacent to the bottom thereof into the opening to the discharge flue, said discharge flue and fluid pressure pipe merging into a common discharge pipe.

5. In a device for feeding pulverized material, a suitable receptacle, a pipe adapted for connection with a source of supply of fluid under pressure, and a discharge flue from said receptacle, said feeding device being provided with passageways communicating with said pipe and leading into said receptacle and terminating in jet orifices directed across said receptacle adjacent to the bottom thereof into the opening to the discharge flue, said discharge flue and fluid pressure pipe merging into a common discharge pipe, a damper which controls the ports between said fluid pressure pipe and the passageways leading into said receptacle and a damper which controls said fluid pressure pipe at a point between the said ports and the point at which said fluid pressure pipe and discharge flue merge.

6. The combination with the discharge pipe of a device for feeding pulverized material by means of a fluid blast, of means for diffusing the blast from said discharge pipe, said means consisting of a flared mouth-piece

at the end of said discharge pipe, a cone secured within said flared mouth-piece with its apex disposed inwardly, and vanes in said flared mouth-piece, said vanes being inclined to a plane or planes through the axis of said mouth-piece.

7. The combination with the discharge pipe of a device for feeding pulverized material by means of a fluid blast, of means for diffusing the blast from said pipe, said means consisting of a pipe section adapted to telescope in the end of said discharge pipe, a flared mouth-piece at the end of said pipe section, a cone secured within said flared mouth-piece with its apex disposed inwardly, and vanes in said flared mouth-piece, said vanes being inclined to a plane or planes through the axis of said mouth-piece and means for adjusting said pipe section lengthwise relatively to said discharge pipe.

8. The combination with the discharge pipe of a device for feeding pulverized material by means of a fluid blast, of means for diffusing the blast from said discharge pipe, said means consisting of a pipe section adapted to telescope in the end of said discharge pipe, and a flared mouth-piece at the end of said pipe section, a cone secured within said flared mouth-piece with its apex disposed inwardly, and vanes in said flared mouth-piece, said vanes being inclined to a plane or planes through the axis of said mouth-piece and means for adjusting said telescoping pipe section lengthwise within said discharge pipe, said means comprising a screw-threaded rod connected to said telescoping pipe section and which projects through the wall of said discharge pipe, and a nut threaded to the projecting end of said rod outside of said discharge pipe.

9. In a feeding device of the type comprising a receptacle, a discharge flue therefrom, means for delivering material from said receptacle into said discharge flue and a pipe adapted for connection with a source of supply of fluid under pressure with which said discharge flue communicates, of means for breaking down the material contained in said receptacle to prevent "bridging" thereof, said means consisting of a jet of fluid under pressure directed into said receptacle above the means for feeding the material from said receptacle into said discharge flue.

10. In a feeding device of the type comprising a receptacle, a discharge flue therefrom, means for delivering material from said receptacle into said discharge flue and a pipe adapted for connection with a source of supply of fluid under pressure with which said discharge flue communicates, of means for breaking down the material contained in said receptacle to prevent "bridging" thereof, said means consisting of a jet of fluid under pressure directed into said receptacle above

the means for feeding the material from said receptacle into said discharge flue, said means consisting of a jet of fluid under pressure directed upwardly into the lower end
5 of said receptacle.

11. In a feeding device of the type comprising a receptacle, a discharge flue therefrom, means for delivering material from said receptacle into said discharge flue and
10 a pipe adapted for connection with a source of supply of fluid under pressure with which said discharge flue communicates, of means for breaking down the material contained in said receptacle to prevent "bridging" there-

of, said means consisting of a jet of fluid 15 under pressure directed into said receptacle above the means for feeding the material from said receptacle into said discharge flue, and a valve which controls said jet.

In testimony, that I claim the foregoing as 20 my invention, I affix my signature in presence of two subscribing witnesses this 18th day of July, A. D. 1908.

EDWIN M. BASSLER.

Witnesses:

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K. A. COSTELLO.