Aug. 30, 1932. P. ANGER 1,874,150

MEANS FOR CLASSIFYING MATERIALS IN JET IMPACT PULVERIZERS

Filed Feb. 5, 1931

FIG. 1.

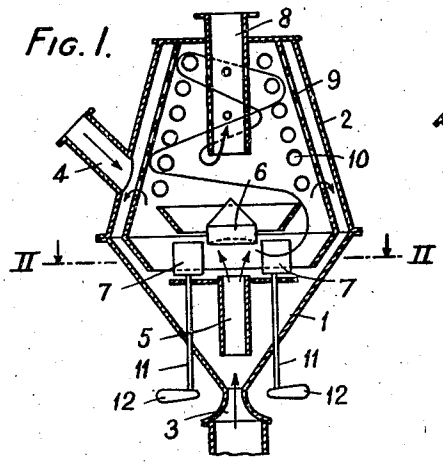


FIG. 3.

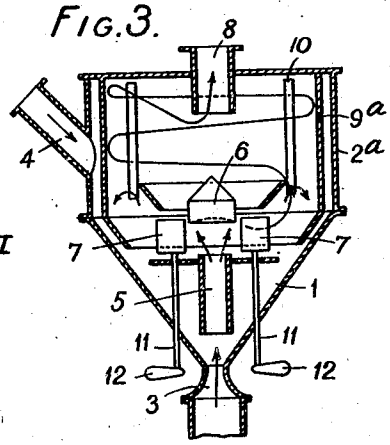


FIG. 2.

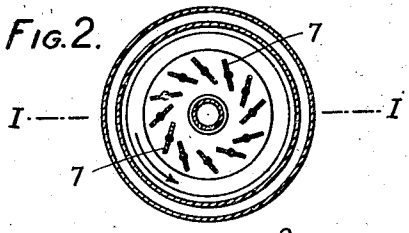
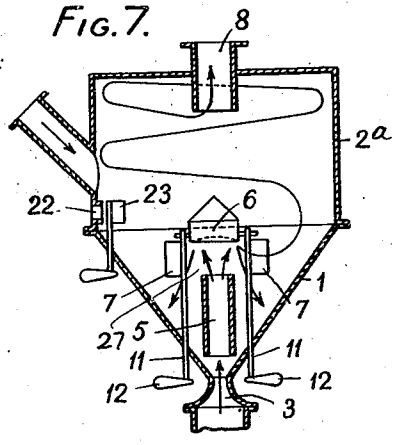


FIG. 7.



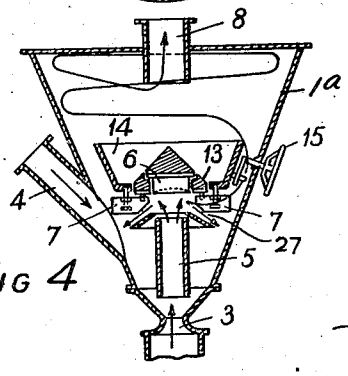


FIG 4

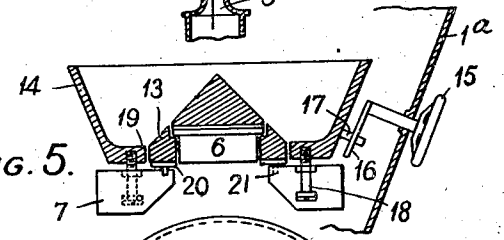


FIG. 5.

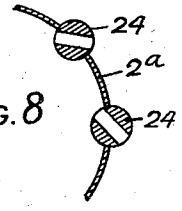


FIG. 8

FIG. 6.

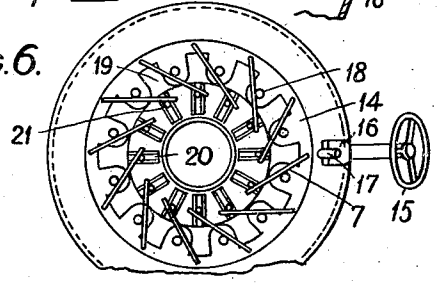
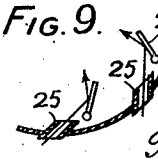


FIG. 9.



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UNITED STATES PATENT OFFICE

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MEANS FOR CLASSIFYING MATERIALS IN JET IMPACT PULVERIZERS

Application filed February 5, 1931, Serial No. 513,563, and in Germany November 27, 1928.

This invention relates to a jet impact pulverizer of the kind wherein the materials are thrown by an air or steam jet against an impact member and then blown upwards by the air current through a surrounding casing, and the invention consists essentially in imparting to the gaseous carrier and to the material suspended therein, as they rise through the casing, a circular motion strong enough to cause the coarser particles to be separated off by centrifugal force and returned to the pulverizing jet while allowing the finer particles to be carried away with the discharged air.

The device employed for imparting circular motion to the materials may consist of tangential deflecting vanes arranged in the radial path of the materials immediately beneath the impact member, and means may be provided for regulating the angular positions according to the desired effect.

When additional air is introduced into the pulverizer, this air may also be utilized for maintaining the materials in circulation, the additional jet or jets being for this purpose introduced in a tangential direction.

Fig. 1 of the accompanying drawing represents a vertical section, on the line I—I of Fig. 2, of a pulverizer according to the invention,

Fig. 2 is a cross section on the line II—II of Fig. 1,

Figs. 3 and 4 are vertical sections of different modifications of the apparatus,

Fig. 5 is an enlarged portion of Fig. 4,

Fig. 6 is an inverted plan of Fig. 4,

Fig. 7 is a vertical section of a further modification of the apparatus, and

Figs. 8 and 9 are sectional part views of modifications of the apparatus shown in Fig. 7.

The apparatus comprises a casing into which the materials, such as coal or the like, are fed from a chute 4 while a strong jet of air or steam enters through a nozzle 3 at the funnel shape bottom of the casing. The materials are caught by the jet and driven by the latter through a mixing tube 5 which directs them against an impact member 6 whereby they are disintegrated and then flung outwards in a radial direction. In this radial path of the materials tangential deflecting vanes 7 are arranged, according to the invention, so as to impart to the materials and to the gaseous carrier a circular motion which is continued while the materials are carried upwards through the casing. The circular motion is strong enough to cause the coarser particles to be thrown by the centrifugal force against the casing wall and to be returned along the latter together with the fresh materials to be pulverizing jet for renewed treatment, while the finer and therefore lighter particles are carried away by the air through a discharge pipe 8 at the top of the casing.

In the construction according to Figs. 1 and 2, the casing comprises two conical portions 1 and 2 which are interconnected at their wide ends so that the casing tapers upwards as well as downwards. The upper portion of the casing is double-walled, and the impact member 6 and the deflecting vanes 7 are arranged so that the disintegrated materials are circulated within the inner cone 9 while the fresh materials are fed downwards through the space between the walls. The inner casing 9 is provided with perforations 10 through which the course, centrifugally separated particles pass into the space between the walls where they descend together with the fresh materials to the bottom of the casing for renewed treatment.

The shape of the casing may be varied. In the device shown in Fig. 3, the upper portion 2*a* of the casing is cylindrical and, since there is therefore a greater distance between the walls and the discharge pipe 8, the casing can be made shorter without detriment to the separating action. The inner cylinder 9*a* may be provided with longitudinal slits 10 instead of round apertures. With this construction of the casing it is also possible to do without the inner wall, as shown in Fig. 7.

As even better action is obtained with the casing 1*a* shown in Fig. 4, which is constructed as an inverted cone and leaves, around the discharge pipe 8, a wide space wherein the movement of the materials is decelerated and the coarser particles enabled

to descend along the inclined casing walls.

Means may be provided for varying the angular positions of the deflecting vanes 7 and thereby regulating the sifting action according to requirements. For this purpose the vanes may, as shown in Figs. 1, 2, 3 and 7, be connected to vertical shafts 11 which can be turned from the outside by means of crank handles 12.

An alternative arrangement is shown in Figs. 4 to 6 wherein the vanes are mounted on pivots 18 connected to a conical guide ring 4 which surrounds the impact member 6. The ring is rotatable to a limited extent and can be adjusted from the outside by means of a hand wheel 15 connected to a shaft carrying a forked arm 16, the latter engaging a pin 17 on the ring. The inner ends of the vanes 7 are fitted with pivot pins 21 which engage in radial guideways 20 made at the underside of a stationary ring 13 situated between the ring 14 and the impact member 6, the latter being supported on the ring 13. The displacement of the pivots 18 by means of the hand wheel 15 brings about the required adjustment of the vanes. The pivots 18 are connected to lugs between which, as shown in Fig. 6, spaces 19 are left for the discharge of materials settling within the ring 14.

Additional air, when such is introduced into the pulverizer, may also be utilized, as shown in Fig. 7, for maintaining the materials in circulation, the air being for this purpose introduced in a tangential direction. The additional air may be introduced through radial nozzles 22 behind which adjustable vanes 23 are arranged for deflecting the jets in the desired tangential direction. The vanes 23 may be omitted, and the casing may be fitted with adjustable nozzles 24 as shown in Fig. 8. It is also possible to employ fixed nozzles 25 arranged, as shown in Fig. 9, so as to give the air jets originally a tangential direction, alterations in the direction being effected by means of adjustable vanes 26.

A space 27 is preferably left between the vanes 7 and the upper end of the mixing pipe 5, to enable coarse particles to be repelled and returned to the pulverizing jet without touching the vanes, the latter being thereby protected from excessive wear.

The air or steam may either be sucked or forced through the casing.

I claim:

1. A jet impact pulverizer of the character described, comprising a casing, means for feeding materials into said casing, means for forcing a vertical stream of fluid into said casing and through said materials so as to entrain particles of said materials, an impact member in said casing arranged in the path of said stream of fluid and entrained particles so as to cause the latter to be reduced by impact with said member, deflecting means in said casing adapted to impart a whirling motion to the stream of fluid and reduced particles coming from said impact member, and means in said casing for guiding the centrifugally separated coarser particles back into the entering stream of fluid.

2. A structure as claimed in claim 1 wherein the casing has a double wall within its upper portion and wherein the materials are fed into the casing through the space between the walls.

3. A structure as claimed in claim 1 wherein the casing has a double wall within its upper portion and wherein the materials are fed into the casing through the space between the walls, the inner wall being perforated to admit the centrifugally separated coarser particles into the space between the walls.

4. A structure as claimed in claim 1 wherein the deflecting means are adjustable for varying their angular positions and the direction of the deflected streams.

5. The structure claimed in claim 1 in combination with a tube in said casing arranged to receive the stream of fluid and entrained particles and direct them against the impact member.

6. The structure claimed in claim 1 in combination with a tube in the casing arranged to receive the stream of fluid and entrained particles and direct them towards the impact member, the deflecting means being spaced from the tube to enable coarser particles to be returned to the stream of fluid before its entrance into the tube without touching the deflecting means.

7. The structure claimed in claim 1 in combination with means for introducing additional fluid in a tangential direction into said casing.

8. The structure claimed in claim 1 in combination with adjustable means for introducing additional fluid in a tangential direction into said casing.

9. The structure claimed in claim 1 in combination with means for introducing additional fluid into said casing, and means for tangentially deflecting said additional fluid within said casing.

10. The structure claimed in claim 1 in combination with means for introducing additional fluid into said casing, and means for tangentially deflecting said additional fluid within said casing, said latter means being adjustable for varying the tangential direction of said additional fluid.

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