

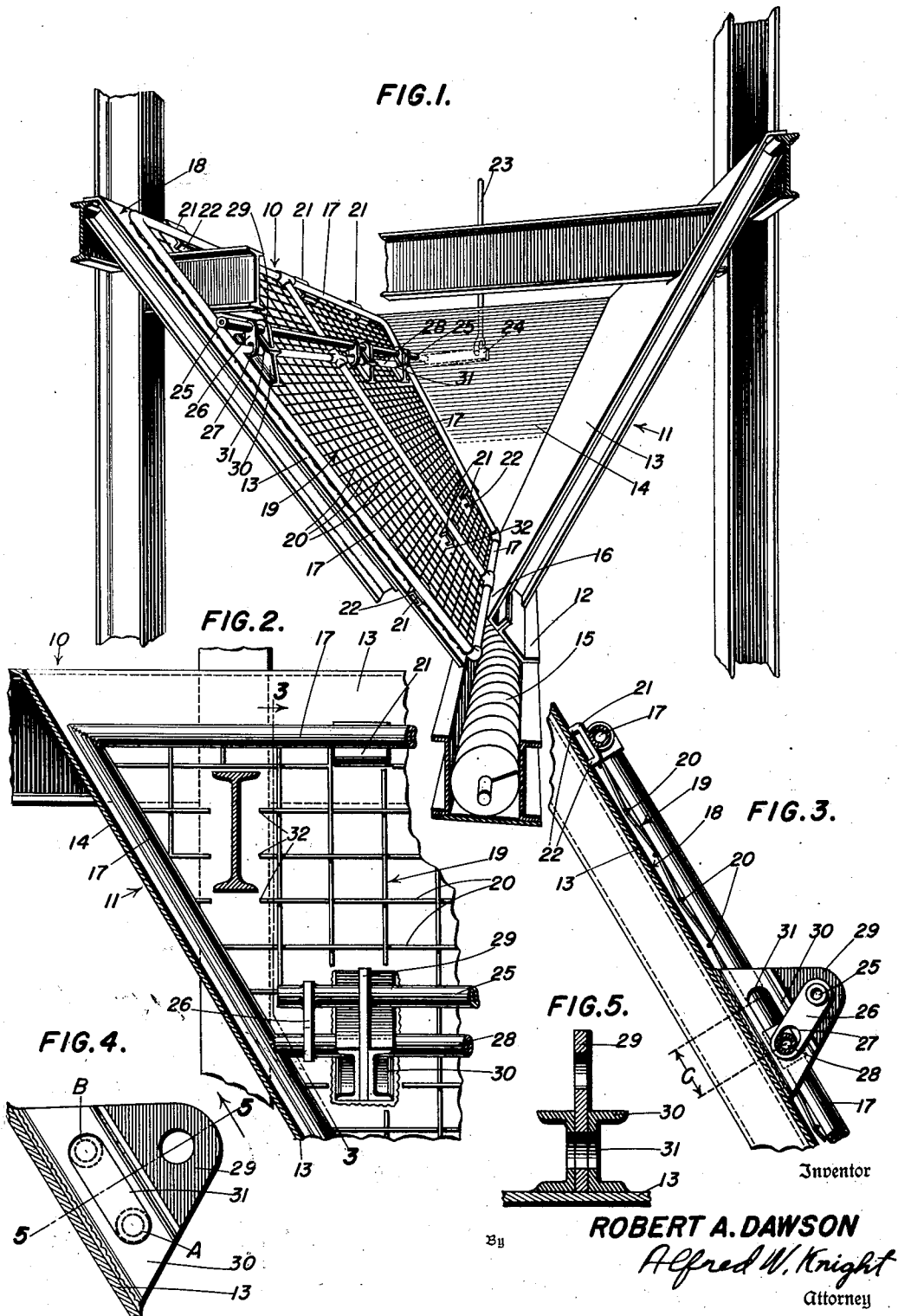
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MATERIAL DISPENSING HOPPER

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MATERIAL DISPENSING HOPPER

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1 Claim. (Cl. 259-47)

1

This invention relates to improvements in hoppers for dispensing mobile material and, more particularly, to means for preventing bridging and sticking of the material in the hopper and thereby insuring the free discharge of the material from the hopper.

Typically, material dispensing hoppers have at least one sloping wall and bridging or sticking of comminuted materials, such as cement, flour, dust from air cleaning systems and the like, is particularly apt to occur in connection with such sloping walls. It has been found that such bridging and sticking may be effectively prevented by means of the apparatus of the invention which comprises a plurality of spaced parallel scraper members, typically in reticulated arrangement positioned along the inner surface of at least one wall of the hopper, preferably at least on a sloping wall thereof, and means for reciprocating the scraper members by an amount at least as great as the distance between the parallel scraper members in the direction of reciprocation.

It is therefore an object of the invention to provide a hopper having a shaker frame movably positioned adjacent the inner surface of at least one of its walls, and comprising parallel, closely spaced scraper members adapted to be reciprocated along substantially the entire inner surface of said wall.

Another object of the invention is to reciprocably mount a flat, reticulated shaker frame in closely spaced relationship to the inner surface of at least one wall of a hopper to agitate the transient material along said wall and prevent its bridging across the hopper channel.

Another object of the invention is to provide a shaker frame for the purpose stated, including scrapers in the form of meshed wire or equivalent reticular structure to disturb the material in a virtually unbroken plane adjacent to at least one wall of the hopper.

Another object of the invention is to provide means to reciprocate the shaker frame in said plane and to produce a jar on both the upstroke and downstroke thereof.

A further object of the invention is to provide a hopper agitator comprising reciprocably mounted, parallel members spaced apart a distance not exceeding the amplitude of reciprocation of said members, thereby to insure the traversal of the entire scraping plane in every movement of the frame, both up and down.

Other objects and advantages will appear in the following description of an illustrative em-

2

bodiment of the invention with reference to the accompanying drawing in which:

Fig. 1 is a perspective view of a typical hopper, parts being shown in section, with the improved agitator of the invention mounted therein;

Fig. 2 is an elevation of the upper left corner of the hopper of Fig. 1, parts being shown in section;

Fig. 3 is a vertical section taken on the line 10-3-3 of Fig. 2;

Fig. 4 is a detail elevation of one of the bearings, the hopper wall being shown in section, and

Fig. 5 is a vertical section on the line 5-5 of Fig. 4.

Figure 1 of the drawing illustrates a typical embodiment of the improved agitator 10 in a hopper 11 such as is commonly used to direct transient material, such as flour, cement and the like, into a lower container, for example, the conveyor trough 12. The hopper shown has side walls 13 which converge toward the trough. It also has end walls 14, one of which is shown in Fig. 1, the other in Fig. 2. These, too, converge toward the trough, producing the general contour of a funnel which defines a channel through which the flowing material is guided. A screw 15 in the trough is adapted to be driven, thereby to continuously transport the material to a point of discharge.

Comminuted material is likely to build up across the hopper throat 16 and thus bridge the hopper channel. This bridging is prevented by the agitator 10, as appears below, but the scope of the invention is broader than its combination with a hopper of the type disclosed. The agitator, being movable, may be utilized over the surface of a variety of walls equivalent to 13, for the purpose of preventing a transient material from caking, banking or bridging.

Thus the disclosure is to be regarded as illustrative of one embodiment of the invention and not as a limitation upon its use. The agitator 10 is shown in conjunction with only one hopper wall, it being within the purview of the invention to employ similar agitators on one or more additional walls, all to the common purpose of agitating that stratum of material next to the inside surface of the respective wall to prevent bridging.

The agitator 10 comprises a frame 17 which consists of tubing or the like, suitably joined at the corners and shaped to suit the contour of the wall 13. Upon the lower side of this frame, in other words, that side next to the surface 18 (Fig. 3), is stretched a coarse wire screen 19.

3

The boundaries of this screen are suitably secured to the frame 17, as by welding, so as to be an integral part of it.

Its weight holds the frame 17 down, the necessity for simple hold-down means occurring only in cases wherein the wall 13 is disposed otherwise than as shown. Spacers 21 support the frame in spaced, uniform position upon the surface 18. Said spacers are rectangular pieces of metal bent in U-form. The bridges of the U's are welded or otherwise secured to selected rails of the frame, the edges 22 (Fig. 3) riding the surface 18 as shown. The overall height of each spacer may be about one inch.

Since the screen 19 is on the under side of the frame (Fig. 3), the scrapers 20 are spaced closely from the surface 18, thus occupying a plane or zone of operation so near to the respective wall that the disturbance of the stratum therein will assure the prevention of bridging. Movement is imparted to the frame 17 by a link 23 which extends off to a suitable shaking mechanism. This link is connected to an operating lever 24 which extends out from one end of a shaft 25.

A rocking motion of the shaft results from the operation of the link and lever 23, 24 but here, again, it is not necessary to always shake the frame with a reciprocating motion to achieve the purpose. The scraper elements 20 could be oriented other than crosswise and a motion other than reciprocatory would cause them to continuously interrupt a stratum of material in close proximity to the surface of a supporting wall. The shaft 25 has one or more cranks 26 secured to it as shown, the free ends thereof having elongated openings 27 (Fig. 3) to contain portions of tube 28 which is a part of the frame 17.

Bearings 29 support the shaft 25 for its turning movement when actuated by the link and lever 23, 24. Said bearings form parts of bases 30 which, desirably, are of a sturdy construction. These bases are welded or otherwise firmly secured to the wall 13, each one of them having a slot 31 through which the tube 28 extends. The length of the slots is a little less than the throw of the cranks 26. This causes the tube 28 to strike the respective ends of the slots at the end of each stroke (positions A and B, Fig. 4), producing a jar on both the upstroke and downstroke. The jarring action shakes loose any material tending to stick to the frame.

4

It is to be observed that the spacing of the scrapers 20 (Figs. 2 and 3) is slightly less than the amplitude C of reciprocation. Slight variations in the ratio of spacing and amplitude are immaterial so long as the spacing between the scrapers does not exceed the amplitude C. The purpose of the invention is served if the amplitude of reciprocation is at least as great as the distances between the scrapers, the intent being to produce a complete traversal of the material in the zone of interruption adjacent to the surface 18.

In practice, the hopper must be strongly supported in order that it bear the weight of the material in it and to withstand the vibration of the shaking and jarring. The supporting and bracing structure is shown in only a general way in the drawing without describing the details, it being observed, however, that where parts extend from wall to wall or from a wall into the hopper channel, as in the case of the bearings 29 and bases 30, the wire screen 19 is cut out to provide adequate clearance.

I claim:

In a material dispensing hopper having a sloping side wall and an end wall at one end thereof, an agitator comprising a frame disposed adjacent said side wall and a screen secured to said frame and extending adjacent substantially the entire inner surface of said side wall and providing a plurality of longitudinally extending scrapers spaced from one another in a direction parallel to the slope of said side wall, a plurality of bearing members secured to said side wall and extending through openings provided by cutting away portions of said screen, a longitudinally extending shaft disposed inwardly of said agitator, extending through said end wall and rotatably supported on said bearing members, cranks secured to said shaft and engaging said agitator to effect reciprocation thereof in said direction upon rocking movement of said shaft, said agitator being reciprocable relative to said side wall and said bearings a distance at least equal to the spacing of said scrapers in said direction, and means for rocking said shaft to cause reciprocation of said agitator through said distance.

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