Nov. 20, 1956 H. D. SCHUTTE 2,771,249

SLIDE TRACK MOUNTING MEANS FOR DIFFERENT MESH SIZE SCREENS IN SCREENING MILLS

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Fig. 2

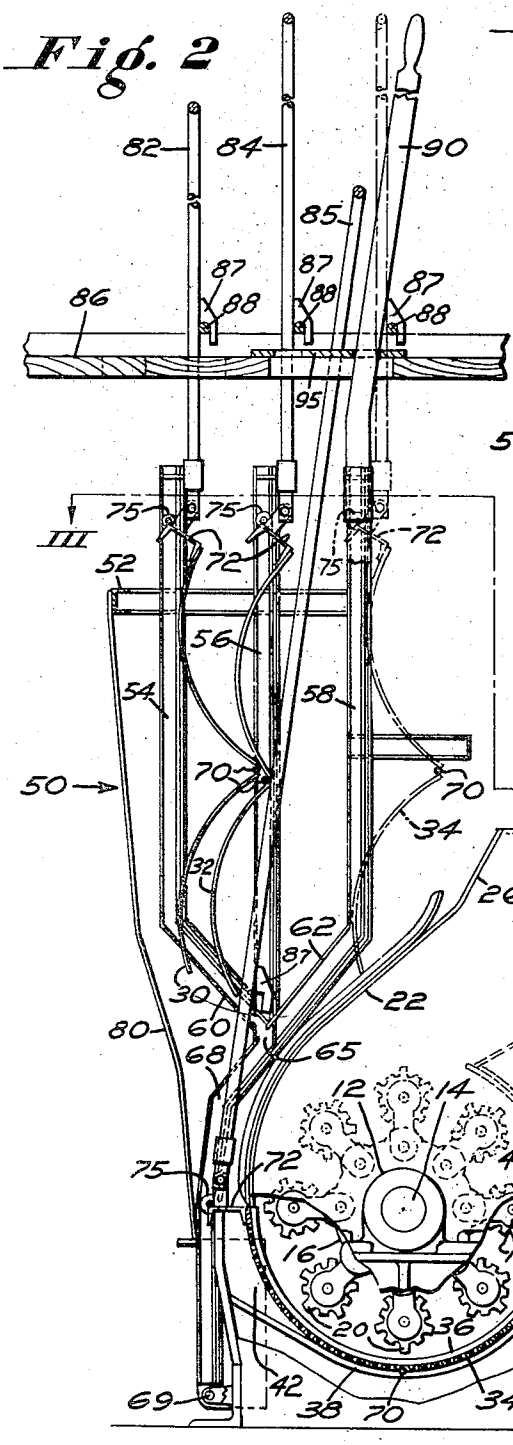


Fig. 1

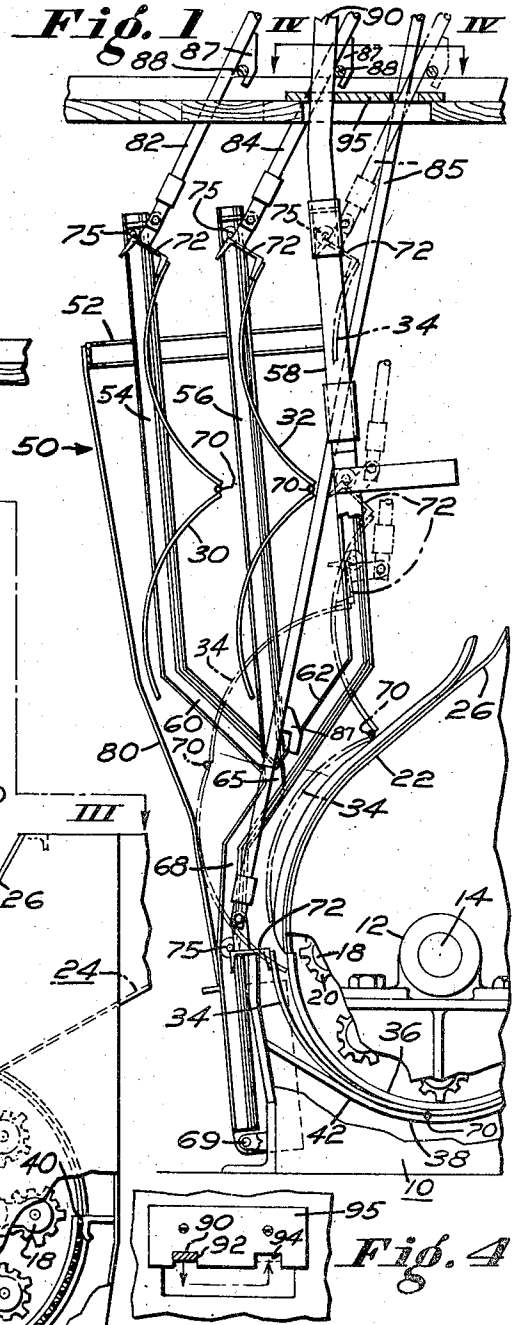


Fig. 4

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Fig. 3

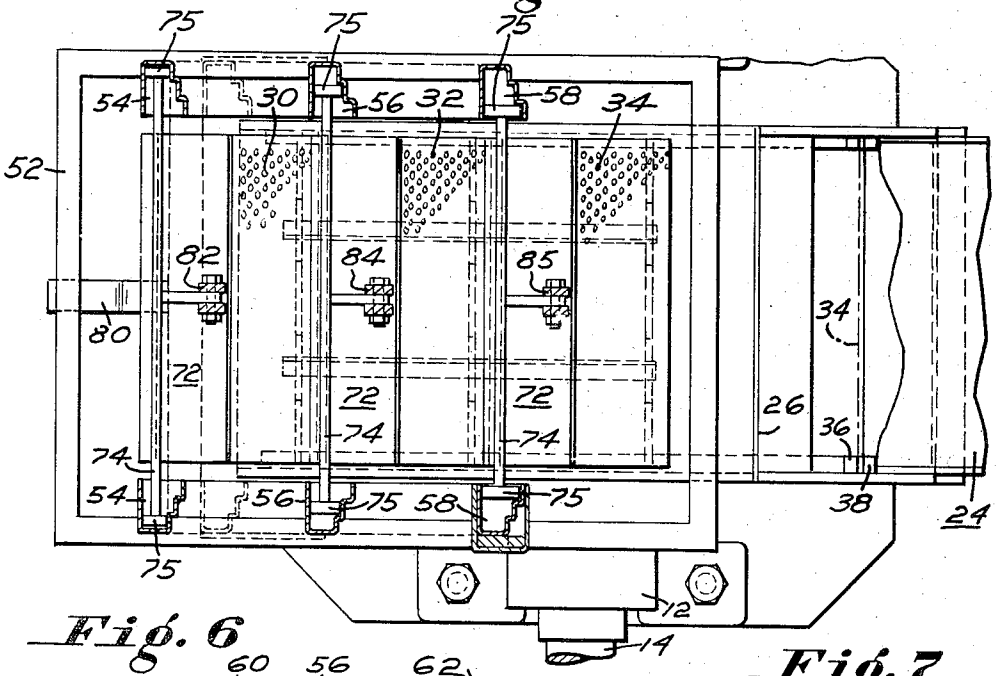


Fig. 6

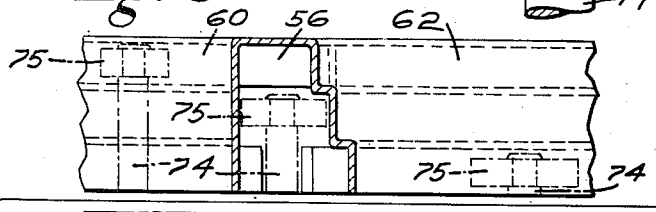
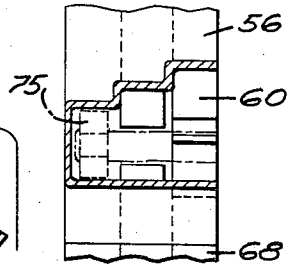


Fig. 7



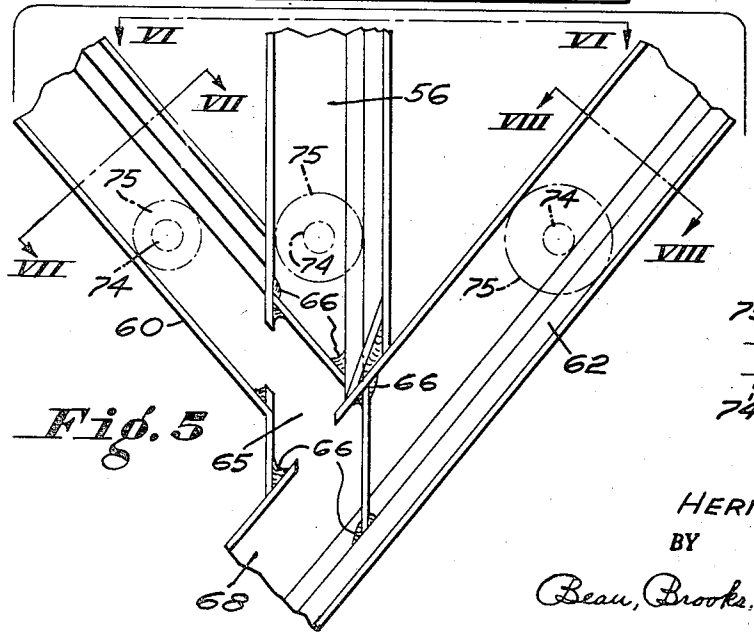
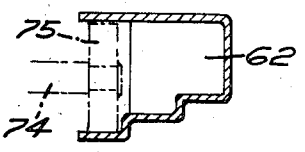


Fig. 5

Fig. 8



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United States Patent Office 2,771,249 Patented Nov. 20, 1956

2,771,249

SLIDE TRACK MOUNTING MEANS FOR DIFFERENT MESH SIZE SCREENS IN SCREENING MILLS

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Application March 29, 1955, Serial No. 497,631

6 Claims. (Cl. 241—89)

This invention relates to screen mills for grinding or pulverizing purposes, as in the case of earlier U. S. Patents Nos. 2,328,170 and 2,532,262; and more particularly to improved means for interchangeably mounting different mesh size screens thereon.

One of the objects of the invention is to provide a pulverizer of the hammer mill type having improved means incorporated therein for mounting the product sizing screen members thereof.

Another object of the invention is to provide a mill of the character described having an improved system for selectively mounting and demounting, alternatively, a plurality of different screens therein, in an improved manner.

Another object of the invention is to provide in a mill of the character described improved means for locking the product screening members in mounted position relative to the mill frame.

Another object of the invention is to provide a mill of the character described having an improved arrangement for quickly and easily exchanging the product screening members thereof so as to grade the mill product to different specifications.

Another object of the invention is to provide a mill for the purposes set forth hereinabove wherein the procedure of exchanging the screen members thereof may be performed with improved safety and facility, while the mill is running.

Other objects and advantages of the invention will appear in the specification hereinafter.

In the drawings:

Fig. 1 is a fragmentary side elevation of a hammer mill, showing a portion of the casing broken away to reveal the interior thereof; and with a screen storage and mounting guide arrangement of the invention in screen changing position;

Fig. 2 is a view similar to Fig. 1 but showing a screen in operative position and the screen clamping mechanism in action;

Fig. 3 is a fragmentary horizontal sectional view taken on the line III—III of Fig. 2;

Fig. 4 is a fragmentary sectional view taken along line IV—IV of Fig. 1;

Fig. 5 is an enlarged elevational view of a detail of the screen change track device of the invention;

Fig. 6 is a section taken along line VI—VI of Fig. 5;

Fig. 7 is a section taken along line VII—VII of Fig. 5; and

Fig. 8 is a section taken along line VIII—VIII of Fig. 5.

The drawings illustrate the invention in connection with a hammer mill of the type that is adapted for example to the grinding or pulverizing of grain or other commodities; and the mill as shown comprises essentially a box-like base or frame 10 carrying bearing blocks 12 at opposite sides thereof for rotatably supporting the rotor shaft 14. The mill rotor 16 is carried by the shaft 14 and in turn mounts a series of hammers 18 which are pivotally connected to the rotor so as to extend radially therefrom.

Heads 20 are carried by the hammers 18 to receive the majority of the wear in connection with processing of the mill feed. An upper casing or cover portion 22 is mounted upon the base 10 so as to complete the mill enclosure, and a mill feed inlet spout 24 is arranged to lead the mill feed through an inlet port 26 of the mill cover so as to deliver the mill feed in the form of a continuous stream into the mill casing and upon the rapidly rotating rotor and hammer unit while traveling in substantially the same direction of movement.

The product screening elements of the mill comprise a set of arcuately shaped screen member of the preferred number, such as perforated sheet metal plates as indicated at 30—32—34 (Fig. 2). Or the screens may comprise woven wire fabrications; or the like as preferred; and when mounted in operative position each screen member extends transversely of the mill frame structure 10 between opposite side wall portions thereof so as to complement and parallel the lower arc of the mill hammer orbit. In the mill of the prior patents hereinabove referred to the screen elements thereof corresponding to the members 30—32—34 illustrated herein are arranged to be mounted in substantially the same manner as is illustrated by the solid line showing thereof in Fig. 2 of the present drawing. However, to provide for exchange of screens of different specifications, the prior art arrangements usually involve some provision for first dropping the mounted screen member downwardly and away from operative position preliminary to removal of the screen from the mill frame; and usually involved the use of relatively complicated screen support and exchange devices in some cases requiring the mill to be stopped before the screen members may be exchanged with safety.

Also, in the case of the prior art referred to hereinabove, the arrangements thereof for accommodating withdrawal and replacement of screens through an opening at the front end of the mill often include removable means for levering and latching the screens in operative positions. The present invention provides further improvements in the screen manipulating and locking mechanisms in such mills.

As in the case of the prior patents hereinabove referred to, in accord with the present invention the opposite side wall portions of the mill base frame 10 are provided with inwardly extending ledges 36—36 which are of circularly arcuate form in side view and disposed concentrically of the center of rotation of the rotor-hammer unit. A second set of inwardly extending ledges 38—38 are similarly arranged to extend inwardly from the side wall portions of the base frame and are arranged in substantial parallelism with and relatively closely spaced relation to the corresponding ledges 36—36 in the region of the rear half of the mill. Thus, a relatively narrow space as indicated at 40 (Fig. 1) is provided between the corresponding ledge members 36—38 at each side of the mill in the rear portion thereof for snug slide-fitting reception and firm mounting of the corresponding side edge portions of the screen members 30—32—34 therebetween. Thus, it will be understood that in the rear portion of the mill the ledge members 36—38 at opposite side wall portions of the mill frame will cooperate to position the rear portion of the screen in operative position and in an attitude of concentricity with respect to the axis of the rotor rotation.

At the forward end portion of the mill, however, the ledge members 38—38 are formed so as to diverge further away from the positions of the corresponding ledge members 36—36 so as to provide a funnel-like space as indicated at 42 (Figs. 1 and 2) between corresponding of the ledges 36—38 within which the ends of the screen members are "funneled" during screen mounting operations, as will be explained hereinafter.

The screen members 30—32—34 are formed to be of resilient nature and to have a tendency to "set" in a curvature approximately similar to the curve of the trackways defined by the ledges 36—38. Thus, any one of a number of screens such as the members 30, 32, 34 may be mounted singly within the mill by initially disposing it in a pick-a-back relation upon the casing top wall 32. Then when the lower end of the screen member is inserted into the funnel-like spaces between the ledges 36—38, the screen member may be slid downwardly and under the rotor hammer assembly as its leading end portion proceeds rearwardly of the mill and is guided between the closely spaced ledges 36—38 into its final operative position. As will now be explained, the screen positioning and locking mechanism of the invention is then brought into action to complete the installation of the screen member in operative position.

The screen storage and positioning mechanism of the present invention comprises a unitary frame work designated generally at 50 which may include a rectangularly shaped girth member 52 embracing the upper ends of parallel vertically directed trackway members 54—56—58 which are disposed in opposed parallel relation at opposite sides of the mill casing. The track portion 54 leads at its lower end into a bent track section 60 and the track section 58 leads into a reversely bent track section 62 which meets with the lower end of the track section 56 and the bent track section 60 at a "frog" portion of the trackway system as indicated at 65. Thus, for example as illustrated in Fig. 5, the trackway portions 56, 60, 62 may be conveniently fabricated of channel-sectioned pressed metal pieces suitably cut away and welded together as indicated at 66, while a terminal track section as indicated at 68 leading down from the frog 65 is conveniently provided as an extension portion of the track piece 62, as shown in Fig. 5. The lower ends of the terminal track sections 68—68 at opposite sides of the mill are pivotally connected to the base plate of the mill as indicated at 69 (Figs. 1, 2). Thus it will be appreciated that the entire trackway structure including the cage-like enclosure 52 is freely pivotable upon an axis defined by the aligned pivot pins 69—69, such as between the positions thereof shown in Figs. 1 and 2, respectively.

The screen members in the case of the present invention are preferably provided in two-piece form, as illustrated in Figs. 1 and 2 and interconnected by hinge devices as indicated at 70; and each of the screen devices may carry at its upper end a flange device, such as illustrated at 72. Thus the flange devices conveniently carry axles 74 carrying at their opposite ends rollers 75 disposed to run within the corresponding trackways 54, 56, or 58, as the case may be.

As shown in Figs. 3, 5, 6, 7, 8, the trackway devices 54, 56, 58 may be of stepped sectional channel form, so as to provide three differently dimensioned roller trackways; and in such event the rollers 75 of the screens 30, 32, 34 are of different diameters and the corresponding axles 74 are of different lengths, so as to adapt the rollers of the screen 30 to run in the trackway 54 and to be grinded to run within the smallest width portions of the frog devices 65—65. Similarly, the rollers of the middle screen 32 are disposed to roll within the tracks 56—56 and the intermediately dimensioned sections of the frog devices 65—65; while the rollers of the screen device 34 are disposed to run within the trackway 58—58 and widest width portions of trackway frogs.

Thus, it will be appreciated that the screen device 30 is suspended by its axle 74 and its rollers 75—75 which are adapted to run within the smallest dimensional portions of the track sections 54—54 from a stored position of the screen as illustrated by solid lines in Figs. 1 and 2, downwardly and thence underneath the mill, as into the operative position thereof as indicated at 34 in Fig. 2; the rollers 75—75 of the screen member having in the meantime traveled downwardly through the track sections 54—54 and through the curved track sections 60—60 and thence through the frogs 65—65 and thence downwardly through the terminal track portions 68—68.

To facilitate guidance of the lower end portions of the screens into operative position under the mill as shown in Fig. 2, a guide device as indicated at 80 is preferably provided to steer the screens so that their lower ends will enter the funnel-shaped openings 42 previously referred to, when the screens are lowered through the trackway system as explained hereinabove. Hence, the screen devices 32, 34, may be lowered alternatively through the trackway and frog system into the terminal track portions 68—68, and thence into operative position under the mill.

In order to provide for convenient handling of the screen devices in connection with alternative mountings thereof under the mill device, a push-pull handle is connected to each of the screen members as indicated at 82, 84, 85 respectively. These handle devices may conveniently extend upwardly, as through a suitably apertured portion of a flooring (as indicated at 86) located above the elevation of the mill, and hook devices 87 may be provided in conjunction with each of the handle devices for hanging the latter upon support bars 88 extending transversely of the apertured portions of the flooring. A pivot control arm 90 is preferably provided to extend rigidly upwardly from the pivotable trackway structure, and is arranged to be alternately engageable with spaced notches 92—94 in a latch plate 95 (Fig. 4) which is bolted or otherwise suitably affixed to the flooring, for locking the pivotable trackway stretcher alternately between "open" and "closed" positions, as shown in Figs. 1 and 2, respectively.

Thus, it will be appreciated that when the control arm 90 is manually thrust toward the left as viewed in Figs. 1 and 2 and locked in the notch 92 of the latch plate, the trackway system will be thereby held in "open" position as shown in Fig. 1; whereupon either one of the screen devices 30, 32, 34 may be lowered from the storage "magazine" into operative position under the mill. This is accomplished by first lifting the control handle thereof so as to release the hook device 87 thereof, and then manually lowering the screen through the trackway and frog system, as explained hereinabove until the lower end portion of the screen enters the funneled-shaped openings 42—42 and thence slides inwardly under the mill into operative position, as shown in Fig. 2. The trackway system may then be pivoted back toward the right by pulling upon the arm 90, and the control arm 90 is then locked in the latch device 95, as shown in Fig. 2. This operation causes the trackway system to swing upon the pivot pins 69—69 so as to squeeze the top edge of the inserted screen into operative position against the mill ledges 36. The mill is then ready to operate to pulverize feed material and to discharge the same in accord with the sizing requirements specifying use of the screen so inserted in the mill.

Then, whenever it is necessary to produce a differently sized mill product, the lever 90 is first released from detent 94 and swung toward the left into the detent 90, thereby opening the mill, whereupon the previously operative screen may be withdrawn from the mill by pulling upwardly upon its corresponding handle until the screen is raised to the elevated position thereof as shown in Figs. 1 and 2. The handle is then hooked upon the corresponding cross bar 88, and another appropriately sized screen is then unhooked and lowered through the trackway system into operative position under the mill. The trackway system is then again "closed" or swung toward the right into the position shown in Fig. 2, whereupon the mill is again ready to operate. Thus, it will be appreciated that the mill of the invention includes a novel screen "magazine" and screen change trackway system which is of structurally simplified form, and which greatly facili-

tates rapid and convenient change of screen sizes, without requiring stopping of the mill operation.

Although only one form of the invention has been shown and described in detail, it will be apparent to those skilled in the art that the invention is not so limited but that various changes may be made therein without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. In combination, a mill including guide track means for mounting a screen in operative position thereon, and a screen magazine device comprising a plurality of guideways adapted to separately support a plurality of screens for interchangeable mountings thereof in said mill, said guideways including convergent portions for guiding the corresponding screens to a common point of discharge from the magazine into said mill, said magazine being pivotally connected to said mill, and lever means extended from said magazine and manually operable to swing the discharge portion of magazine toward and away from said mill.

2. In combination, a mill including guide track means for mounting a screen in operative position thereon, a screen magazine device comprising a plurality of guideways adapted to separately support a plurality of screens for interchangeable mountings thereof in said mill, guide track means, said guideways including convergent portions for guiding the screens to a common outlet track for discharge from the magazine into said mill, said magazine being pivotally connected to said mill, lever means extended from said magazine and manually operable to swing the outlet track portion of magazine toward and away from said mill guide track means, and handle means connected to each of said screens for manual movements thereof between magazine-stored and mill-mounted positions.

3. In combination, a mill including abutment means for holding a screen in operative position thereon, a screen magazine comprising a plurality of guideways adapted to separately support a plurality of screens for interchangeable mountings in said mill, said guideways including convergent portions for guiding the corresponding screens to a common discharge trackway leading from the magazine into said mill, said magazine being pivotally connected to said mill, lever means extended from said magazine and manually operable to swing the magazine between screen open and closed positions, and handle means connected to said screens for manual control thereof.

4. In combination, a mill including a slide track means for guiding a screen into operative position thereon, a

screen magazine device comprising a frame structure carrying a plurality of guideways adapted to separately support a plurality of screens, said guideways including convergent portions guiding the screens to a common discharge guideway in alignment with said mill slide track means, said magazine frame being pivotally connected to said mill, and lever means extending from said magazine frame and manually operable to swing the discharge guideway portion of said magazine toward and away from said mill.

5. In combination, a mill including slide track means for guiding a screen into operative position thereon, and a screen magazine device comprising a frame supporting a plurality of guideways adapted to separately support a plurality of screens at an elevation above said mill, said guideways including convergent portions leading to a common discharge guideway in registry with said mill slide track means, said magazine being pivotable relative to said mill, a handle extending upwardly from each of said screens, and hook means disposed above said magazine and adapted to engage said handles for holding the latter so that said screens are thereby held up at an elevation above said discharge trackway portion of said magazine while being selectively releasable from said hook means for lowering said screens alternatively into operative position in said mill.

6. In combination, a mill including slide track means for guiding a screen into operative position thereon, and a screen magazine device comprising a frame supporting a plurality of generally parallel guideways adapted to separately support a plurality of screens at an elevation above said mill, said guideways including convergent portions leading to a common discharge guideway in registry with said mill slide track means, said magazine being pivotable relative to said mill for locking a mounted screen in operative position, handle means extending upwardly from said screens, and hook means disposed above said magazine and adapted to engage said handle means for holding the latter so that said screens may be thereby held up at an elevation above said discharge trackway portion of said magazine while being selectively releasable from said hook means for lowering said screens alternatively into operative position in said mill.

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