A. E. PETERS.

CONVEYING AND SORTING.

APPLICATION FILED JULY 18, 1912.

1,235,157.

Patented July 31, 1917.

3 SHEETS—SHEET 1.

Fig. 1.

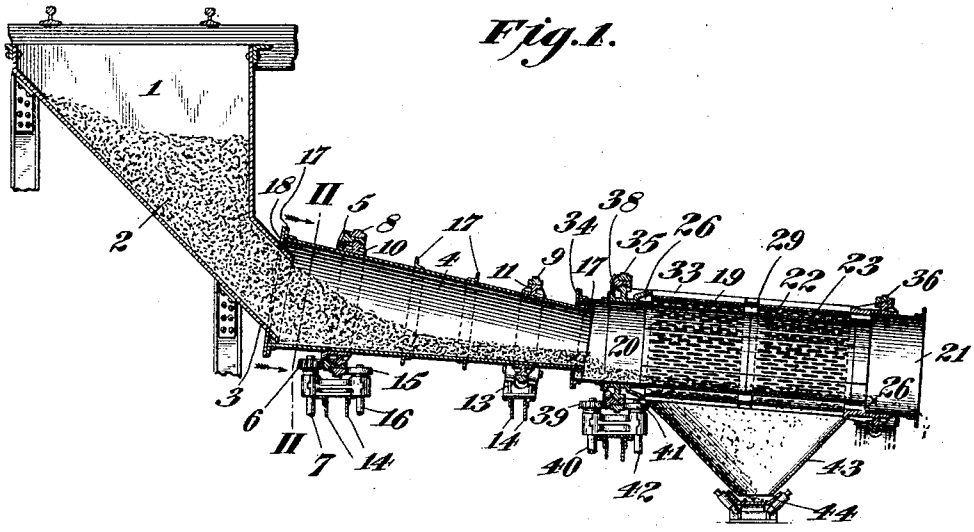


Fig. 2.

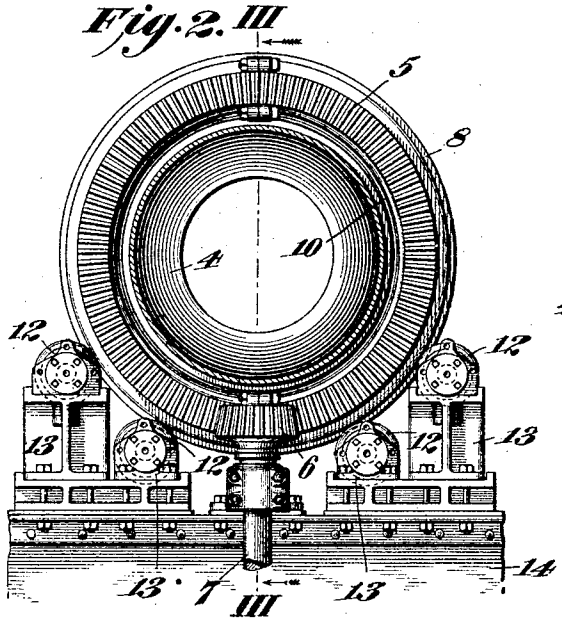
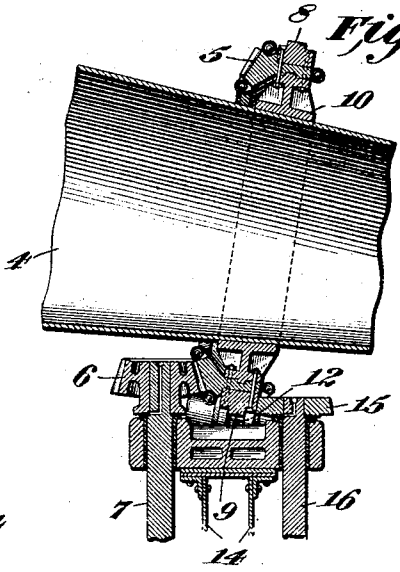


Fig. 3.



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3 SHEETS—SHEET 2.

Fig. 4.

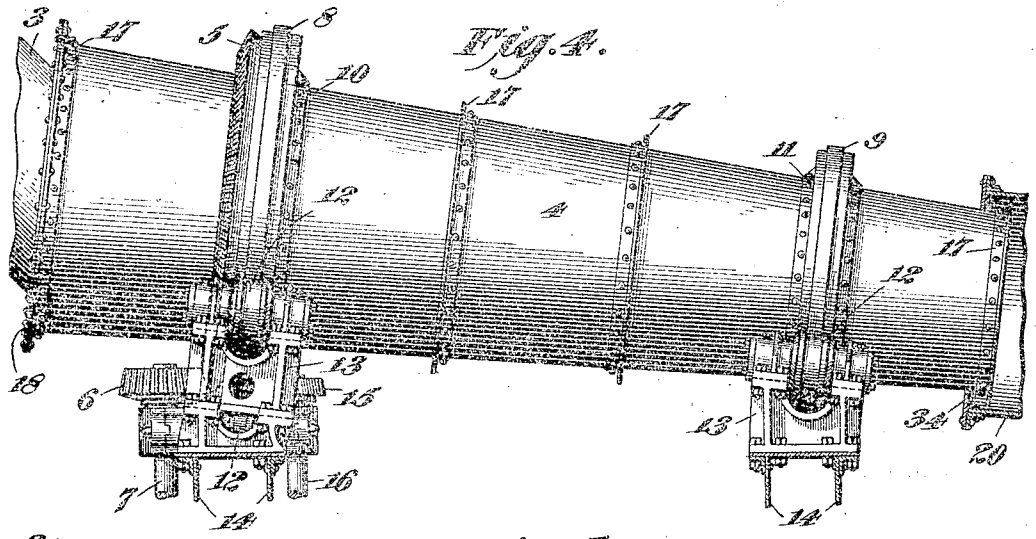
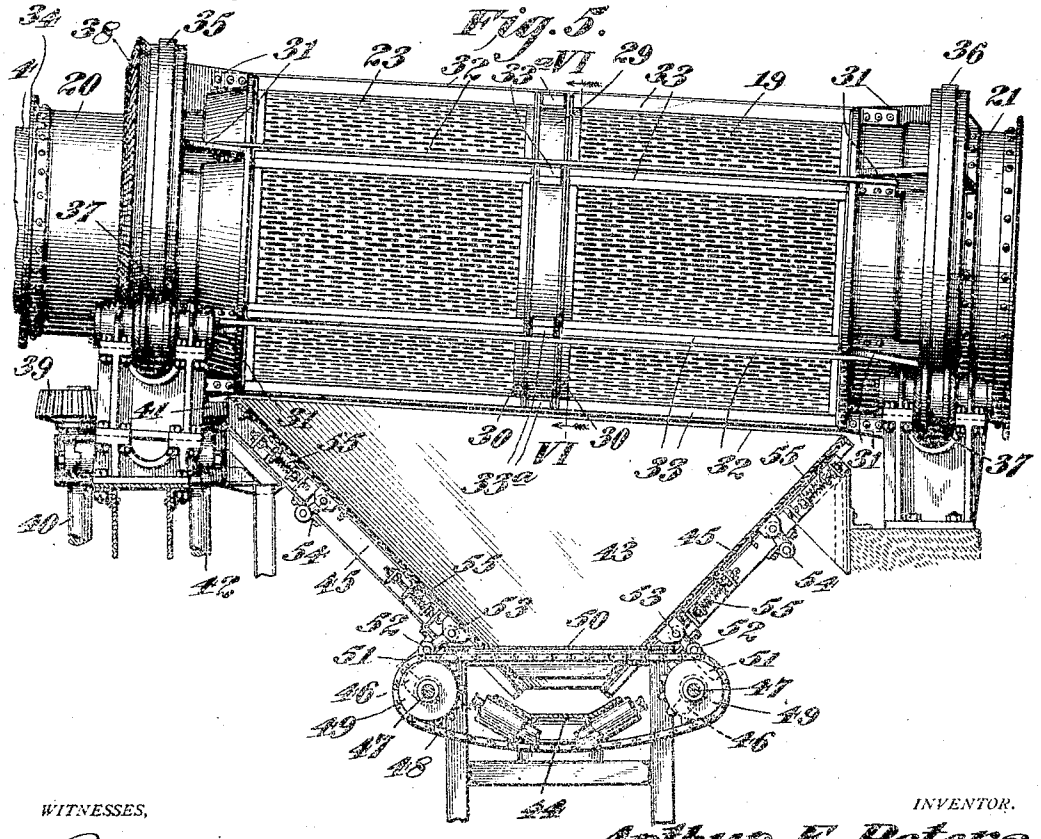


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

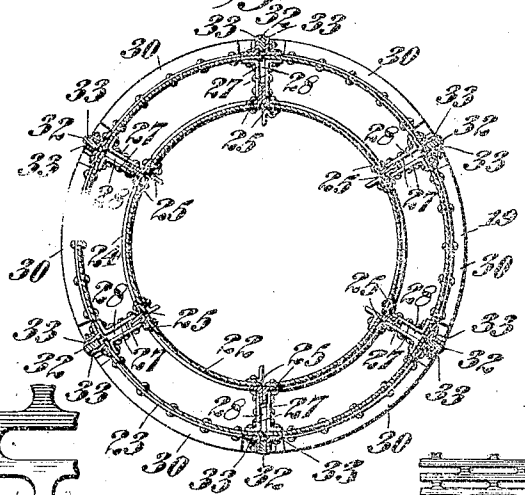


Fig. 8.

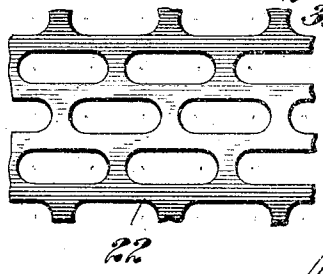


Fig. 9.

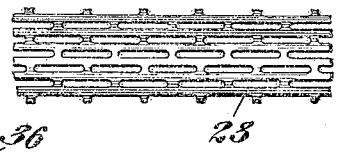


Fig. 7.

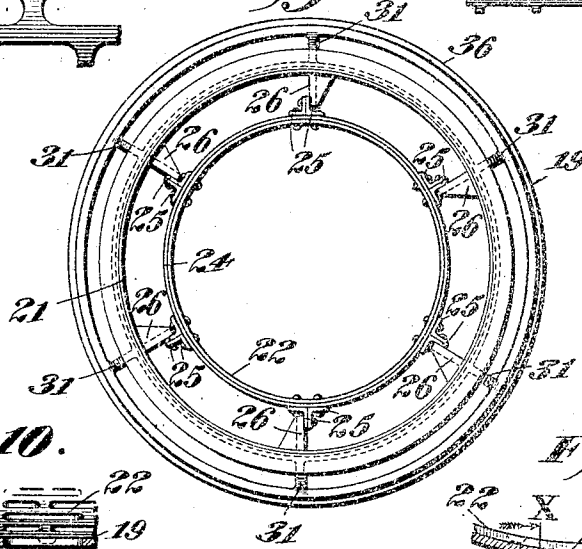


Fig. 10.

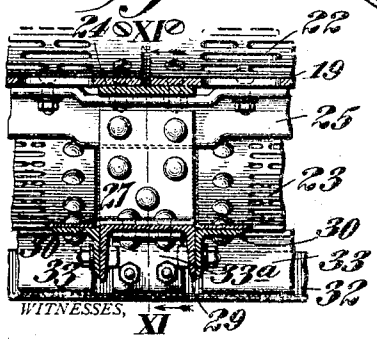
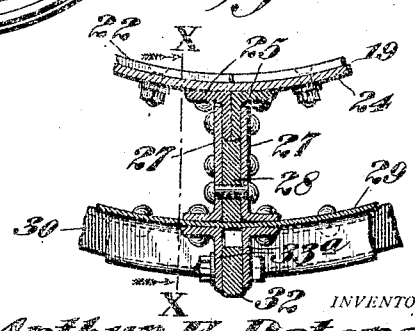


Fig. 11.



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CONVEYING AND SORTING.

1,235,157. Specification of Letters Patent. Patented July 31, 1917.

Application filed July 18, 1912. Serial No. 710,134.

To all whom it may concern:

Be it known that I, ARTHUR E. PETERS, a citizen of the United States, residing in the borough of Westmont, in the county of Cambria and State of Pennsylvania, have invented certain new and useful Improvements in Conveying and Sorting; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to conveying and sorting granular materials, whether coarse or fine, or both, and its object is to provide improved method and means by which I am enabled to receive at one end of the conveyer in bulk, large quantities of said material and deliver it in a smaller and substantially uniform stream or supply from the opposite end of the conveyer into a rotary screen in quantity as desired.

With my invention the material is dumped into a bin or hopper and fed by gravity through a spout or opening at its lower end, which extends into the upper and larger end of a rotary conveyer which comprises a hollow shell of conical frustum-shape with its lower wall slightly inclined downwardly in the direction of the desired movement of the material to be conveyed.

This conical frustum-shaped shell is supported on rolls or suitable antifriction bearings and is preferably rotated by means of gearing connected to a source of power, and when rotating, advances the material therein from the receiving to the delivery end of the conveyer. By varying the speed or inclination, or both, the rate of discharge may be regulated as desired.

My invention is particularly adapted for use as a conveyer or feeder when screening ores or like substances, although it may be used for charging kilns, furnaces or other receptacles where a uniform feed is desirable, regardless of the somewhat intermittent manner in which it is received.

Heretofore in screening large quantities of ore it was found difficult to graduate the feed of the ore to the screen in such a manner as to give a uniform continuous stream of the desired amount, and there was either an excess or a deficiency of the material, with consequently inefficient and irregular results.

In my invention I have found by actual trials that material charged more or less intermittently and in varying quantities will be leveled to a uniform section or stream after a number of rotations of my conveyer which carries the material up on the side of the said conveyer until the angle of repose of the material is exceeded, and then the material slides down, levels the high places and fills in the low ones.

My invention also relates to receiving the material from my conveyer into a rotary screen, whereby the larger lumps or particles are sorted and advanced from the finer particles by the rotation of the screen.

With these objects in view, my invention comprises certain novel constructions, combinations, operations and arrangements of parts as will be hereinafter more fully described and pointed out in the appended claims.

Referring now to the accompanying three sheets of drawings forming part of this specification, in which:—

Figure 1 is a vertical longitudinal sectional elevation of my apparatus.

Fig. 2 is a vertical transverse sectional elevation taken on the line II—II of Fig. 1.

Fig. 3 is a vertical longitudinal section taken on the line III—III of Fig. 2 showing a portion of my conveyer with the driving gearing attached thereto.

Fig. 4 is a side elevation of my conveyer mounted upon its roller bearings with the driving-mechanism connected thereto.

Fig. 5 is a side elevation of the rotary screen and its roller bearings and driving mechanism; the vibrating receiving hopper and belt conveyer under the rotary screen, being shown in section.

Fig. 6 is a vertical transverse section of the rotary screen taken on the line VI—VI of Fig. 5.

Fig. 7 is an elevation of the discharging end of the rotary screen.

Fig. 8 shows a fragment of the inner

screen plate, and Fig. 9 a portion of the outside screen plate illustrating the comparative sizes of the screen meshes respectively.

Fig. 10 is an enlarged view of a portion of the rotary screen taken on the line X—X of Fig. 11 showing the method of bolting the screen plates to the frame.

Fig. 11 is a detail sectional view taken on the line XI—XI of Fig. 10.

In order to simplify the description, I will generally refer to my invention in connection with handling iron ores for which it is peculiarly adapted, but as aforesaid, it is not limited to this use alone, but may be employed in connection with sand, lime, clay, or in fact any bulk or granular materials, of any sizes or assortments that may be handled thereby.

In the drawings in which like characters of reference designate corresponding parts throughout the several views:—1 indicates the supplying hopper or bin into which is dumped the ore 2 from the cars on the track above, or it may be supplied in any other suitable manner.

The bottom of the hopper 1 is shown to be inclined at an angle of substantially forty-five degrees, although it may be made of any suitable curvature, and terminates in a projecting chute 3 which extends into the upper and larger end of a rotating conveyer 4 comprising a hollow shell preferably of metal formed in a hollow conical frustum-shape, but it can be made cylindrical or otherwise, if desired, but arranged with the line of the bottom of the shell inclined slightly downwardly from the horizontal, from the receiving to the discharging end, so that as the conveyer rotates, the material advances, the rapidity of the advance depending principally on the slope and the speed of rotation.

Mounted on the conveyer casing 4 near its upper end is a beveled gear 5 which surrounds the same and is attached rigidly thereto. A driving pinion 6 is mounted on the end of a power shaft 7 and meshes with the beveled gear 5 for rotating the conveyer. Tires 8 and 9 are attached to the base castings 10 and 11 which encircle the conveyer casing 4 near each end and form the tracks for the supporting flanged rollers 12 which have adjustable bearings 13 mounted on the girder framework 14, the conveyer being prevented from longitudinal movement by a roller 15 mounted on the end of the shaft 16 which rotates in contact with the rear side of the tire member 8. The conveyer has a plurality of annular angular reinforcing ribs 17 and a ring plate 18 at its upper end surrounds the sides of the chute 3 to prevent the escape of the material.

The lower end of the conveyer is shown as extending into the upper end of a rotary screen 19 having imperforate tubular end portions 20 and 21 and intermediate perforated cylindrical double screen portions 22 and 23 constructed one inside of the other with a space between the two, as indicated.

The inner screen 22 has larger perforations than the outer screen and is attached to, and is of the same diameter as the upper or receiving tubular end portion 20, while the outer screen 23 is of the same diameter as the lower end portion 21 and has the smaller perforations.

These screens 22 and 23 as shown in detail in Figs. 8 and 9 are built up of a plurality of plates having elongated perforations, as shown, although perforations of other shapes may be used, if desired.

The central portions of these screens are constructed as shown in Figs. 6, 10 and 11 in which a band 24 connects the central ends of the inner screen plates, while pairs of angles 25 placed back to back and riveted together extend longitudinally connecting together the longitudinal edges of the screen plates 22.

The angles 25 have their extreme ends attached to brackets 26 on the tubular end portions 20 and 21 while centrally they are connected by bent L-shaped plates 27 which act as separators between the two screens.

These bent L-shaped plates 27 are placed back to back, but spaced apart by filler plates 28, one leg of each being riveted to the angles 25, while the other is attached to a channel band 29, to which is secured by means of angles 30, the central edges of the outer screen plates 23. Extending longitudinally on the outside of the rotary screen at the longitudinal meeting edges of each of the outer screen plates 23 and having its ends attached to flanges 31, on the end portions 20 and 21, is a bar 32 which reinforces and connects the longitudinal meeting edges of the plates by means of angles 33. The central portion of the bar 32 is also rigidly attached to the channel band 29 and the bent L-shaped plates 27 by the connecting angles 33^a.

The outer ends of the screen plates may be attached directly to the tubular ends 20 and 21 or by angles, if desired.

A ring-shaped retaining plate 34 is attached to the upper end of the rotary screen member 20 and surrounds the outside end of the conveyer 4 to prevent the infeeding ore from escaping.

The rotary screen has its axis inclined slightly from the horizontal, but preferably at a less inclination than the conveyer 4, although this inclination also may be modified as necessary or desired.

Tires 35 and 36 are mounted on the tubular end members 20 and 21 and form the tracks for the flanged rollers 37 which are

carried by adjustable bearings mounted on suitable supports or as indicated.

A bevel-gear 38 extends from the forward side of the tire 35 and is rigidly secured thereto and meshes with a bevel-driving pinion 39 on the end of the shaft 40, and a roller 41 on the shaft 42 engages with the rear side face of the tire 35 to prevent longitudinal movement of the screen.

As the ore is fed to the continuously rotating screens, the lumps which are too large to pass through the meshes of the screens, are conveyed to the opposite ends thereof and discharged therefrom, while the finer ore is sifted through the screens and falls into the hopper 43 and thence upon the continuously moving belt conveyer 44.

The sides of the hopper 43 are supported on slideways 45 and are made to vibrate thereon by means of tappets 46 keyed on the shafts 47 at each side of the hopper, which have their bearings on the framework at either side of the hopper, skid shafts being driven from the power shaft in any suitable manner. These two shafts 47 are connected together by a sprocket chain 48 and sprockets 49, the chain passing through the hopper and being provided with a hood 50 to prevent contact with the falling ore.

The tappets 46, which are keyed on the shafts 47, as they revolve, contact with the projecting arms 51 pivoted at 52 to the slideways 45 and hinged at 53 to the hopper sides 43. Other swinging hinges 54 at the upper parts of the hopper sides 43 connect them with the slideways 45 and prevent displacement.

The tappets 46 coöperating with the arms 51 vibrate the hopper sides in one direction, while the spring pressed mechanism indicated at 55 returns them to their normal positions.

The operation of my apparatus is as follows:—The ore 2 is dumped into the bin or hopper 1, is fed thence by gravity downward through the chute 3 into the rotating conveyer 4 assuming substantially the position therein as shown in the upper part of Fig. 1. As the conveyer continues to rotate, the ore, as it is advanced, is leveled and delivered to the rotary screens in a substantially uniform stream as shown in Fig. 1. Then the rotary screen 19, as it revolves, advances the ore and the larger lumps, which are too big to pass through the inner screen mesh, are conveyed to the rear end of the screen and discharged therefrom.

The intermediate sized and fine ores pass through the inner screen 22 and, as they advance on the outer screen 23, the finer particles pass through into the hopper 43. The intermediate sized ores are conveyed to the rear ends thereof and are discharged therefrom with the larger lumps, or separately, as desired. The fine ore passes through the meshes of the outer screen and falls upon the vibrating hopper 43, where it is discharged on to the belt conveyer 44.

Although I have shown and described my invention in considerable detail, I do not wish to limit myself to the exact and specific forms and details shown and described, but may use such substitutions, modifications or equivalents thereof, as are embraced within the scope of my invention, as set forth in the claims.

I also wish it understood that by my process and apparatus, I can handle, feed and sort granular materials such as ores, flue dust or other substances, of varying degrees of dryness or moisture, and of different sizes of particles, and to do this to best advantage I can modify the slopes of the apparatus, the speeds of rotation, the sizes and arrangements of the perforations in the screen plates and in fact may modify the details within the limits and scope of my invention as pointed out in the claims.

What I claim as new and desire to secure by Letters Patent is:—

1. The method of conveying which consists in charging into one end of a conveyer by gravity from a large but variable mass large quantities of granular material, and by a rotary spreading progressive advancing movement, transferring it to the opposite end of the conveyer and delivering it therefrom in a comparatively small and substantially uniform stream.

2. The method of conveying which consists of intermittently charging into one end of a conveyer from a variable mass, large quantities of granular material, and subjecting the same to a rotary progressive advancing movement, thereby graduating the flow, transferring it to the opposite end of the conveyer and delivering it therefrom in a comparatively small, substantially uniform stream.

3. The method of conveying which consists in supplying to one end of a conveyer by gravity from a storage bin containing variable amounts, granular material in large quantities, and by a rotary progressive spreading and advancing movement conveying it to the opposite end of the conveyer and delivering it therefrom in a smaller quantity as a substantially uniform stream.

4. A conveyer comprising an inclined hollow shell of conical frustum-shape, means for supplying granular material in large masses into the upper end thereof and for rotating the conveyer, thereby imparting a continuously advancing movement to the material therein and delivering it from the opposite end of the said conveyer in a comparatively small, uniform stream.

5. A conveyer comprising a hollow shell of conical frustum-shape, having its lower interior surface inclined slightly from the horizontal, means for intermittently supplying large masses of granular material into the upper end of said conveyer, and means for rotating the conveyer, thereby imparting a continuously advancing and spreading movement to the material, and delivering it from the lower end thereof in a comparatively small and substantially uniform stream.

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

ARTHUR E. PETERS.

Witnesses:

ROBERT A. BEES,

J. F. GROGAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."