

April 9, 1929.

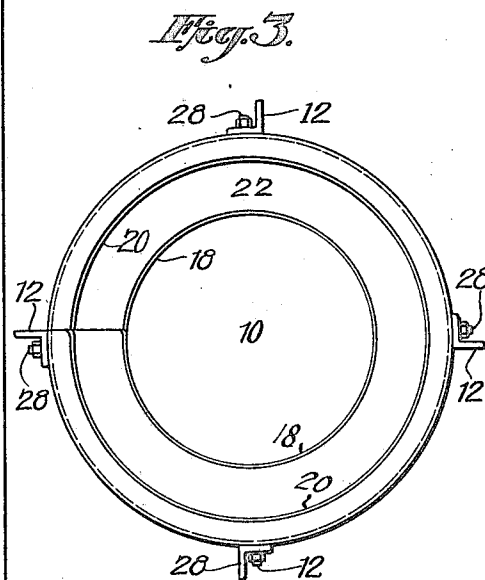
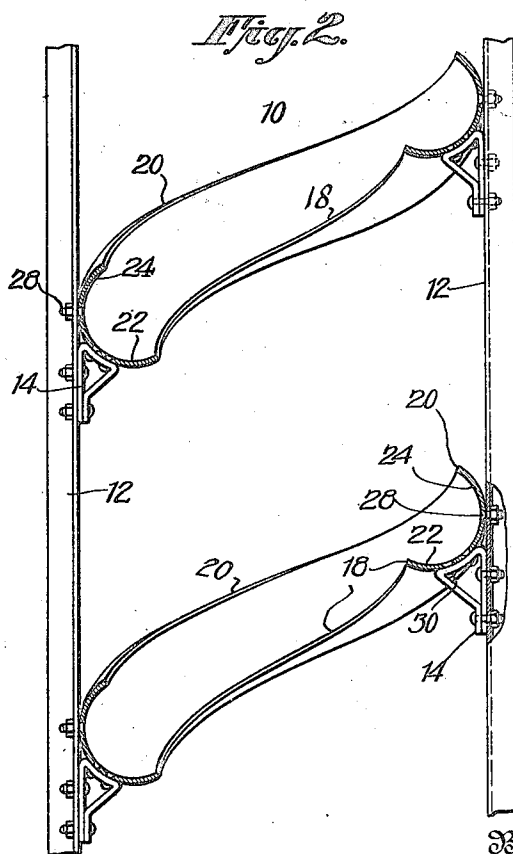
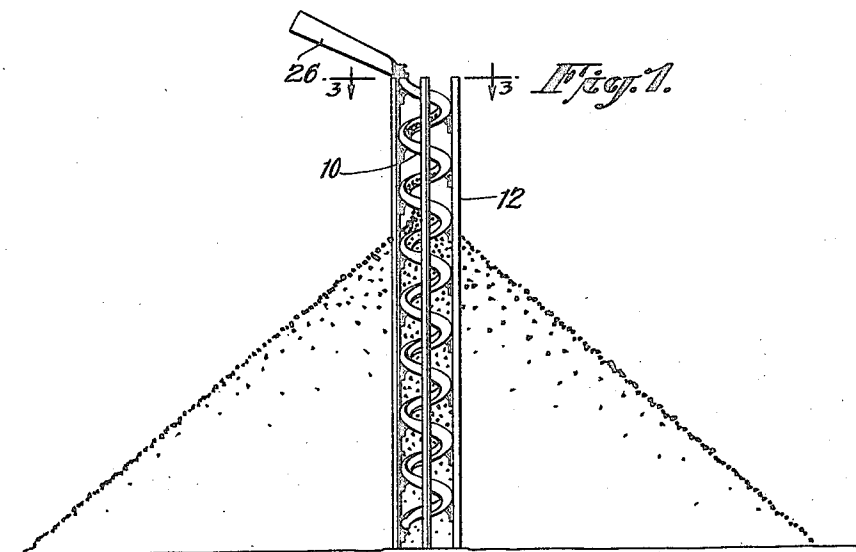
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1,708,029

SPIRAL LOWERING CHUTE AND METHOD OF MANUFACTURE

Filed Feb. 21, 1925

3 Sheets-Sheet 1



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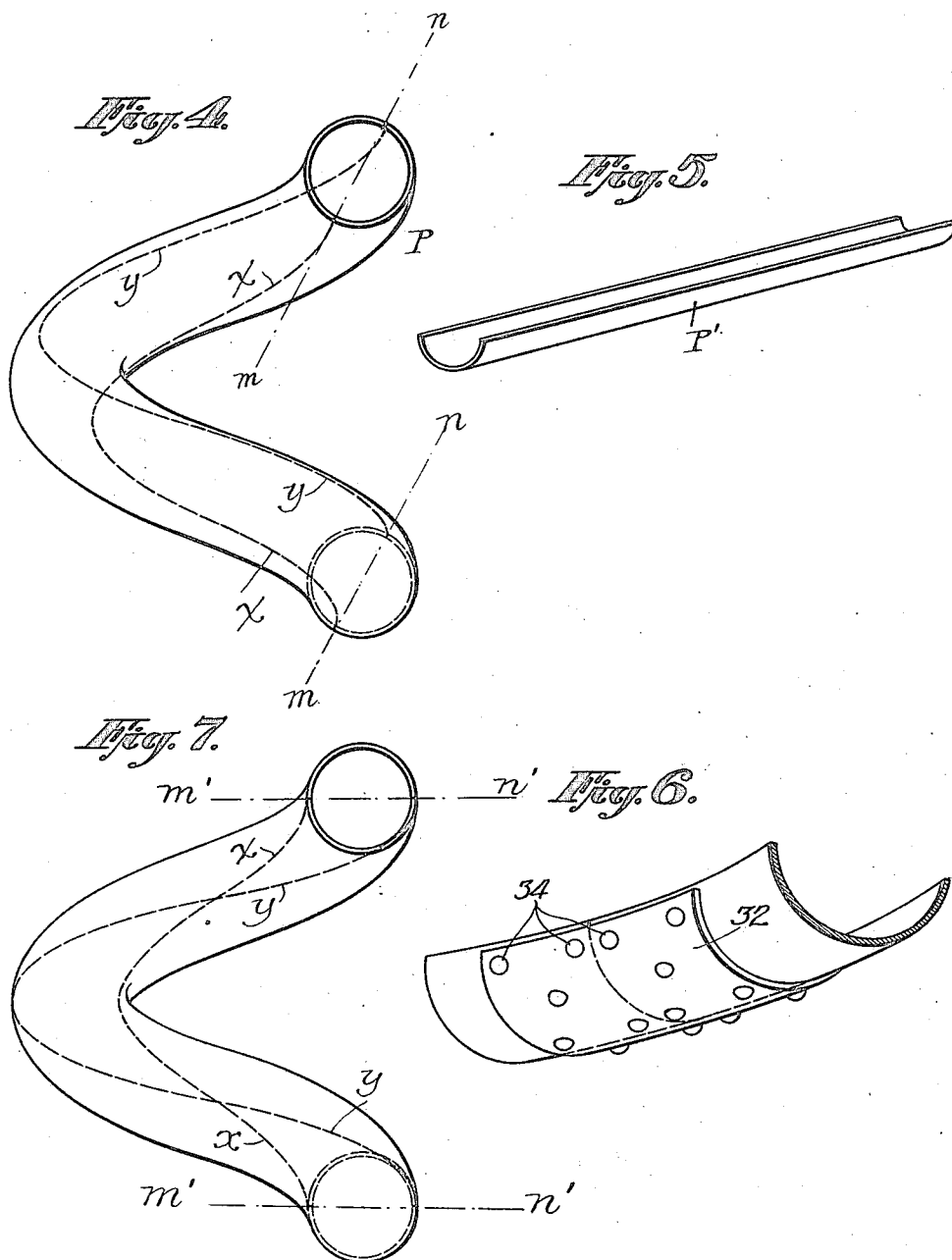
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SPIRAL LOWERING CHUTE AND METHOD OF MANUFACTURE

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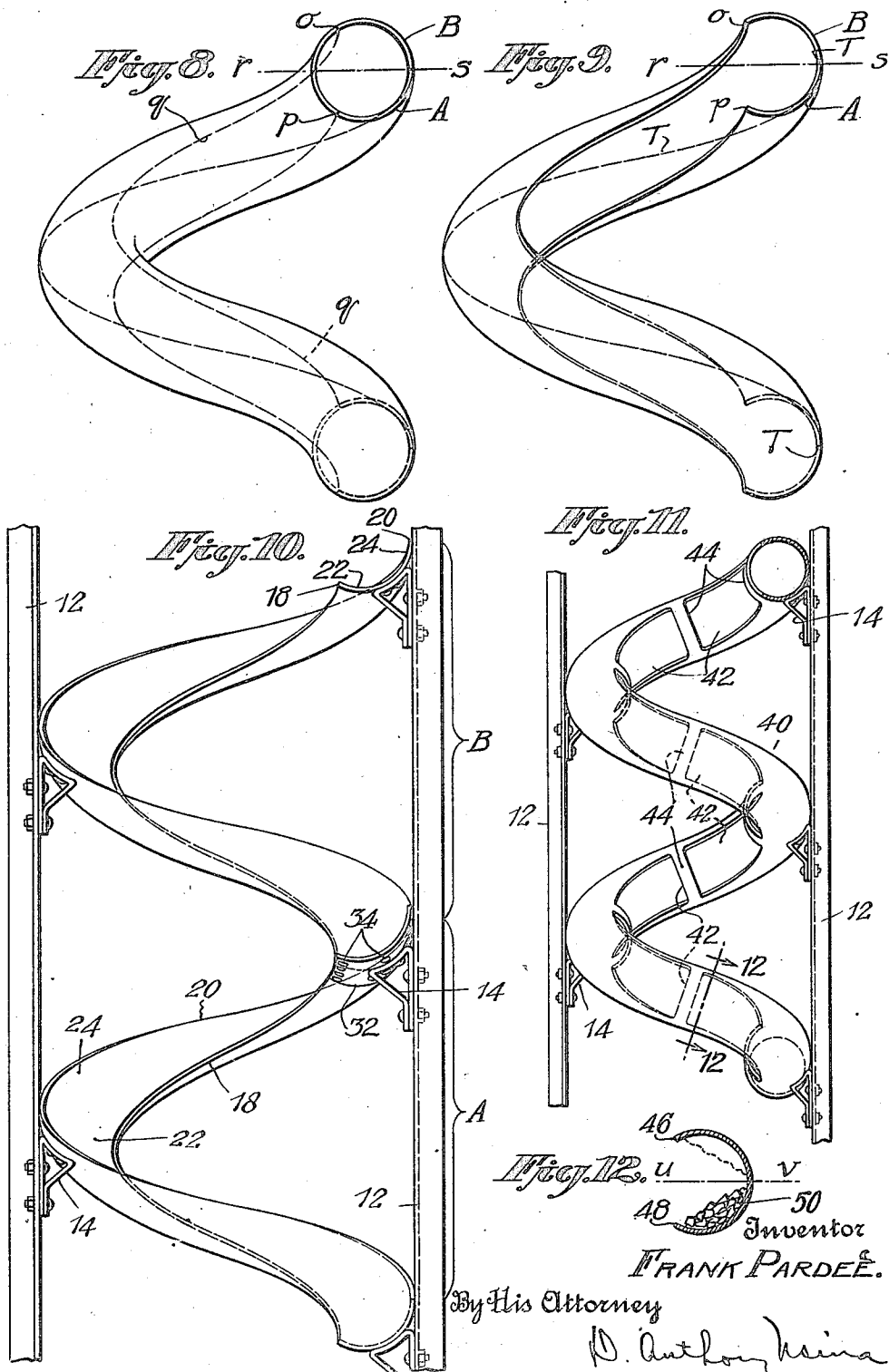
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SPIRAL LOWERING CHUTE AND METHOD OF MANUFACTURE

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3 Sheets-Sheet 3



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SPIRAL LOWERING CHUTE AND METHOD OF MANUFACTURE.

Application filed February 21, 1925. Serial No. 10,740.

This invention relates to spiral lowering chutes adapted for use either as conveyors or separators and to an improved method of manufacturing the same. While not limited thereto, the particular embodiment of the invention illustrated is adapted for piling coal.

In the storage of coal it is important that the mass be lowered in such a way that the lumps are not broken up into smaller sizes, it being well known to those familiar with the coal business, that coal with a minimum of so-called fines commands a higher market value. Coal is frequently stored in bins or in piles in the open and the same is usually discharged from an overhead car traveling on tracks along the top of a shed or bin. There is often a distance of thirty feet or more between the track level and the floor of the storage bin or yard.

Spiral lowering chutes have been found to provide a satisfactory means for stacking or piling coal with the minimum breakage and the same have been used by dealers doing a large volume of business. But for the smaller dealer the cost of chutes as heretofore constructed is almost prohibitive. The lowering chutes previously used have been built up by warping flat segmental plates into an approximately spiral or helical shape and joining the plates at their radial edges, such plates forming the flooring of the runway. In order to prevent the coal from flying off the outer edge of the runway under the influence of centrifugal force it has heretofore been necessary to provide a separate spiral retaining wall or flange following the outline of the edge of the runway.

In the manufacture of the previous forms of lowering chutes care must be taken in laying out the segmental plates to form an approximately true spiral, holes must be accurately located for joining the plates and the side flanges or retaining walls must be carefully formed to follow the line of the runway floor. This all takes time and costs money and while the initial cost of installation does not prohibit the use of the devices by the larger dealers, small concerns find the cost almost prohibitive.

An object of the present invention is to provide a method of manufacture and an im-

proved chute of unique construction which can be manufactured and sold at a lower cost than the types heretofore proposed and yet one which will perform its function equally as well. In the accompanying drawings Fig. 1 illustrates one embodiment of my improved lowering chute;

Fig. 2 is an enlarged longitudinal section of the chute shown in Fig. 1;

Fig. 3 is a section on line 3—3 of Fig. 1;

Fig. 4 is an elevation illustrating a step in the method of forming the runway;

Fig. 5 is a perspective view illustrating a blank from which the spiral may be formed;

Fig. 6 is a detail of a joint between two adjacent sections of the runway.

Fig. 7 is a detail illustrating a modification in the method of forming the runway.

Figs. 8 to 12 show alternative embodiments of the invention.

Referring in detail to the drawings the lowering chute indicated generally by the numeral 10 is supported by a plurality of uprights 12 which at spaced intervals are provided with suitable brackets 14 shaped to fit the underside of the runway.

As best shown in Fig. 2 the runway is of concave cross-section. The embodiment shown illustrates a runway of substantially semi-circular cross-section the same being so disposed that the inner edge 18 of the runway is at a considerably lower elevation than the outer edge 20. This disposition of the metal provides a floor portion 22 and what we may term a side wall portion 24. The coal is fed to the lowering chute from a suitable feed chute indicated at 26 and the material flows by gravity along the spiral floor portion 22 and the side wall portion 24 prevents the lumps from flying off on a tangent under the influence of centrifugal force. The runway may be anchored to the uprights in various ways, the drawing illustrating flush head bolts 28 which pass through suitable holes in the flanges of the uprights 12. Additional securing means may be provided in the form of flush head rivets 30 passing through the runway floor and secured to the brackets 14.

The form of lowering chute above described can be manufactured more easily than the types heretofore proposed. This is especially true when they are formed according

to the method I now propose which contemplates providing a substantially straight length of pipe and bending it to a spiral form of the required pitch and diameter as illustrated in Fig. 4, and then severing the pipe along the spiral lines x and y .

I will usually build the runway in sections of approximately one turn each although, of course, I am not limited to such a step and if desired I may form one half turns, quarter turns or even make the sections in units of more than one turn. The spirals may take different proportions according to the character of the material to be conveyed. While I do not wish to be limited thereto I propose to use pipe say from eight to twelve inches inside diameter and to form spirals varying in outside diameter from about forty inches to forty-eight inches and in pitch from about forty inches to seventy-two inches.

Referring to Fig. 4 it is noted that the pipe P is severed at diametrically opposite points on the line indicated at mn which line is at an angle to the horizontal. When the runway is formed in this way only one half of the pipe is used. I contemplate, however, cutting the pipe as illustrated in Fig. 7 on the line m^1, n^1 . This will produce two trough shaped spirals both of which can be used for some purposes such as a gravity conveyor.

In Fig. 5 I have illustrated an alternative form of blank P' used in building the spiral runway. The form shown in Fig. 5 may be produced either by cutting a pipe or piece of tubing longitudinally or it may be formed by pressing a flat plate or running the same through suitable dies or rolls such as used in the manufacture of pipe or skelp. This substantially U-shaped piece can then be bent to spiral form so as to provide a lowering chute substantially like that shown in Fig. 2.

When the runway of the chute is made in sections of one turn or fractions of a turn, the sections will be connected with one another by suitable splice plates 32 riveted or otherwise secured as indicated at 34 to the adjacent sections as illustrated in Fig. 6.

In the form of invention illustrated in Fig. 2 wherein the spiral chute or runway is formed by severing a spiral pipe at diametrically opposite points at an angle to the axis, for example as indicated at mn in Fig. 4, only one half of the pipe is utilized. This, of course, is wasteful. On the other hand, where the pipe is severed on a horizontal line, as indicated at M', N' in Fig. 7, both halves of the spiral pipe can be used for some forms of conveyor by inverting one half of the pipe and uniting it to the end of the other half thus forming a trough of two complete turns. Such a U-shaped trough as this, however, in which the opposite edges are in the same horizontal plane, does not form the best kind of spiral lowering chute for piling coal as the outer wall is not high enough to prevent the

coal from flying off under the influence of centrifugal force.

By cutting a small strip from the inner portion of the pipe and discarding it and then cutting the remaining spiral section of the pipe in two symmetrical parts, I can provide a structure which is less wasteful of material in the course of manufacture than the construction shown in Fig. 2 and the runway so formed is well adapted for use as a spiral lowering chute for stacking or piling coal. Such an arrangement and its method of manufacture is illustrated in Figs. 8 to 10 inclusive.

Referring first to Fig. 8, I provide a spiral section of pipe of preferably one complete turn. I then sever the pipe by an oxyacetylene torch or otherwise at the points o and p so as to sever a substantially parallel strip q . This strip is discarded or wasted and the remainder of the blank appears approximately as shown in Fig. 9. It is noted that the cuts o and p are made at points in the cross-section of the pipe which are substantially equidistant from the horizontal center line rs . In cross-section, therefore, the spiral runway of Fig. 9 may be said to consist of upper and lower sections of symmetrical form. In some cases I may build the lowering chute of sections such as shown at Fig. 9 and when the lower portion indicated for example at A has become badly worn, I may invert the runway so that the portion indicated at B will become the bottom. In this way, the life of my novel type of lowering chute is very much greater than chutes heretofore proposed. My invention also contemplates providing a lowering chute of substantially the design shown in Fig. 10. In this case the spiral runway is built of a number of sections which are formed by severing a spiral piece of pipe as indicated at T in Fig. 9 and continuing the cut along the spiral line so that the portions A and B form two separate sections. The section B is then inverted and its end is united to the end of section A thus forming the complete runway as indicated at Fig. 10. The splice between the abutting ends is effected by means of a joint such as indicated in detail in Fig. 6. The runway thus formed provides a bottom wall 22 along which the coal travels and a side wall 24 which is adapted to prevent the coal from flying over the edge of the chute under the influence of centrifugal force. It will be further noted that the outer edge 20 of this form of chute is considerably higher than the inner edge 18 although the difference in elevation is not so pronounced as indicated in Fig. 2.

The construction illustrated in Figs. 8 to 10 is that preferred although, of course, I am not limited thereto.

In Fig. 11, I have shown another alternative construction of lowering chute in which

I utilize a spirally formed piece of pipe or tubing 40 which is first shaped to the desired pitch and diameter. I then cut away portions of the pipe as indicated at 42 to provide windows or avenues of escape for the coal or other material flowing along the chute. The cut-outs are made preferably at regular intervals so as to leave reinforcements or connecting ribs 44 which serve to maintain the cross-sectional shape of the pipe.

As indicated in Fig. 12 which is a cross-section on line 12—12 of Fig. 11, the upper and lower edges 46 and 48, respectively, are located at distances symmetrical with respect to the horizontal center line $u-v$. In this figure I have indicated at 50 a cross-section representation of the coal traveling on the runway. It will be noticed that it piles up at an incline which is substantially equal to that of the angle of repose of the coal. The coal travels down the spiral path until it reaches the bottom of the runway where it starts to accumulate on the ground. The following quantities of coal fall over the edge 48 to build up the pile, the latter progressing from the bottom upwardly as will be understood. Finally, the stacking chute becomes practically imbedded or covered by the coal pile as will be understood from Fig. 1. As the coal is used up, of course, the chute is gradually uncovered and when the pile has been consumed the chute can be used again to form another pile. This goes on continuously extending over may be a period of years. Gradually, the portion of the chute over which the coal travels in its spiral trip along the runway, wears away. After this happens the entire runway may be inverted so that the portion which was formerly the top of the runway now becomes the bottom and the coal will be discharged over the edge 46. Thus the life of the lowering chute is practically doubled.

Throughout this description I have emphasized the fact that coal or other material being handled is adapted to fall off the inner edge of the runway. In some forms the edge is continuous as, for example, in Figs. 2 and 10 or the discharge edge is interrupted as in Fig. 11. It is not to be inferred, however, that my invention is limited to a conveyor in which the material is discharged inwardly as to the best of my knowledge I am the first to have proposed making a gravity conveyor by shaping a pipe or tube to spiral form and the invention is intended to embrace a gravity conveyor formed of pipe bent to substantially spiral or helical form and adapted to receive material at the top and to discharge it at the bottom. Such a spiral pipe without apertures or cut away portions is well adapted for lowering coal from one height to another with a minimum breakage of the lumps.

While I have shown upright supports for the spirals in a number of the figures of the

drawings, it is to be understood that in some cases that such supports will be omitted inasmuch as the novel form of chute described is of sufficient rigidity to be self-supporting. When the uprights are omitted the spiral will be held in place by suitable braces secured to the chute and anchored to the walls of the coal pocket or other adjacent structure.

In the foregoing detailed description the invention has been described as embodied in a spiral lowering chute and the method of manufacturing the same. However, it is to be understood that many of these advantages apply to spiral chutes used for other purposes such, for example, as those used in separating coal from slate and other impurities. The term "chute" as used in the claims is intended to apply to coal separators as well as to the type of apparatus in which the chute is merely used to convey material from one point to another.

Though I have described quite specifically certain details of construction and specific steps in the method of producing the runway, it is not to be construed that I am limited thereto as various modifications both in construction and method of manufacture may be resorted to without departing from the invention as defined in the appended claims.

What I claim is:

1. In the manufacture of spiral chutes, the method which consists in providing a length of tubing, bending the same to form a spiral of determined pitch and diameter, removing a part of the tube thus leaving a concave chute of the required pitch and diameter.

2. In the manufacture of spiral chutes, the method which consists in providing a straight length of pipe, bending the same to form a spiral of determined pitch and diameter, severing the pipe along substantially parallel lines to form two concave chutes.

3. In the manufacture of spiral chutes, the method which consists in providing a straight length of pipe, bending the same to form a spiral of determined pitch and diameter, severing the pipe along substantially parallel lines to form two concave chutes, inverting one of the chutes so formed and joining it to an end of the other.

4. In the manufacture of spiral chutes, the method which consists in providing a straight length of pipe, bending the same to form a spiral of determined pitch and diameter, removing a piece from the inner portion of the spiral and dividing the remaining portion along a substantially spiral line to form two symmetrical chutes, inverting one of said chutes and joining it to the end of the other to form a continuous spiral runway.

5. A lowering chute of the class described comprising a runway formed of a plurality

of tubular sections bent to spiral form and joined end to end, each section having a cut-away portion to permit material to fall inwardly from the runway.

- 5 6. A lowering chute of the character described comprising a spiral runway formed of a plurality of sections joined end to end,

each section comprising a pipe segment whose inner spiral edge is lower than its outer spiral edge.

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In witness whereof, I have hereunto signed my name.

FRANK PARDEE.