H. ADAMS.

COAL STORAGE APPARATUS.

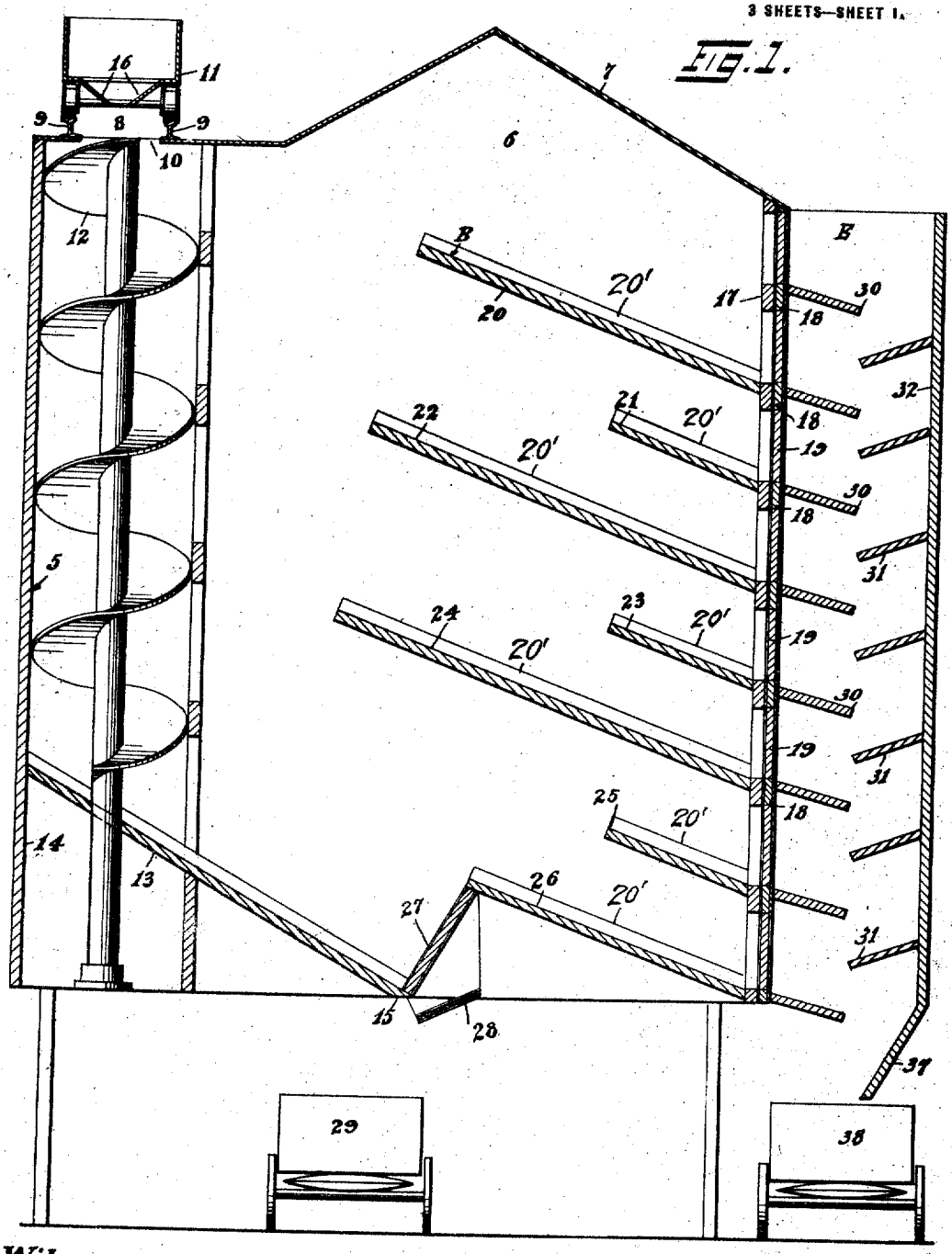
APPLICATION FILED OCT. 12, 1916.

1,259,583.

Patented Mar. 19, 1918.

3 SHEETS—SHEET 1.

Fig. 1.



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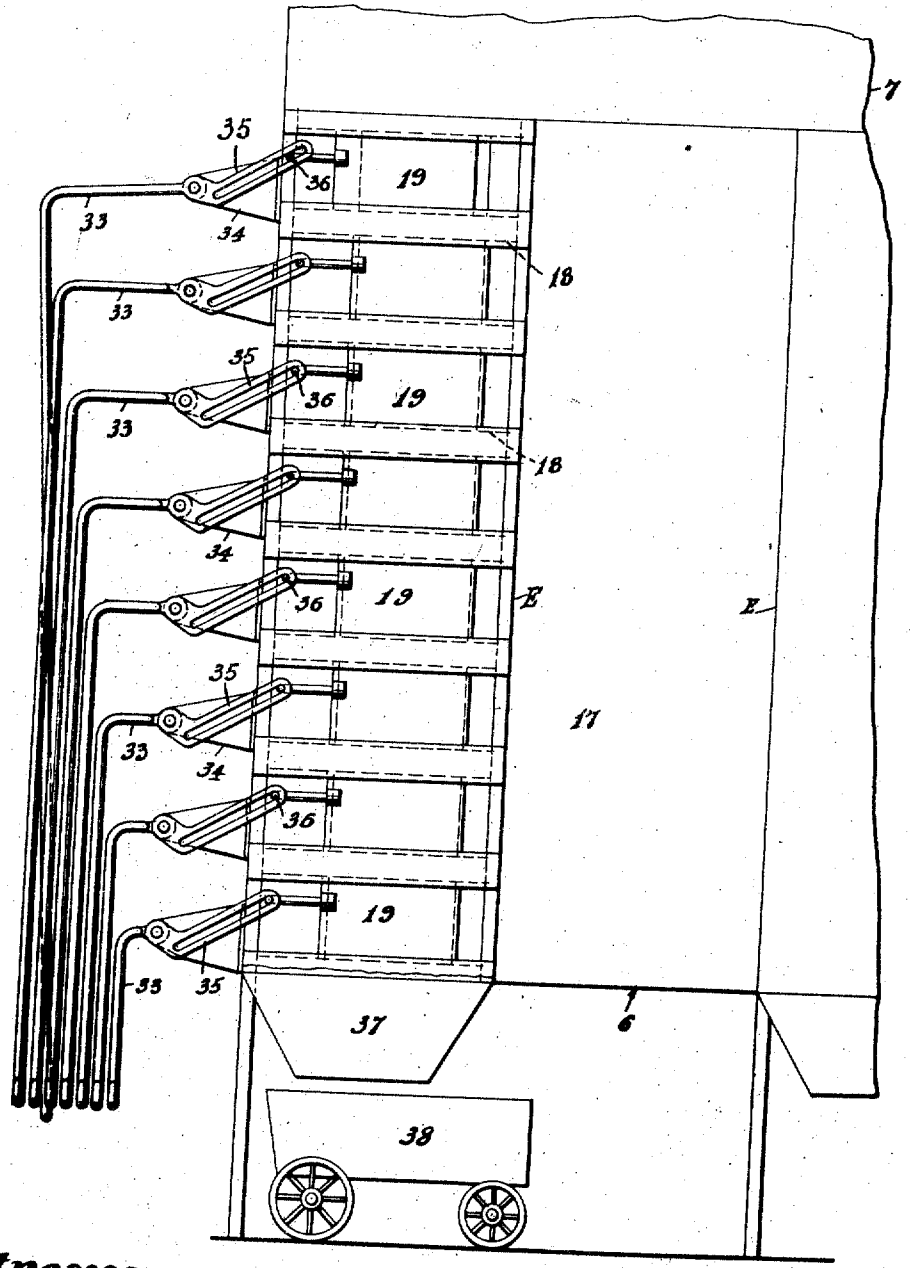
3 SHEETS—SHEET 2.

FIG. 2.



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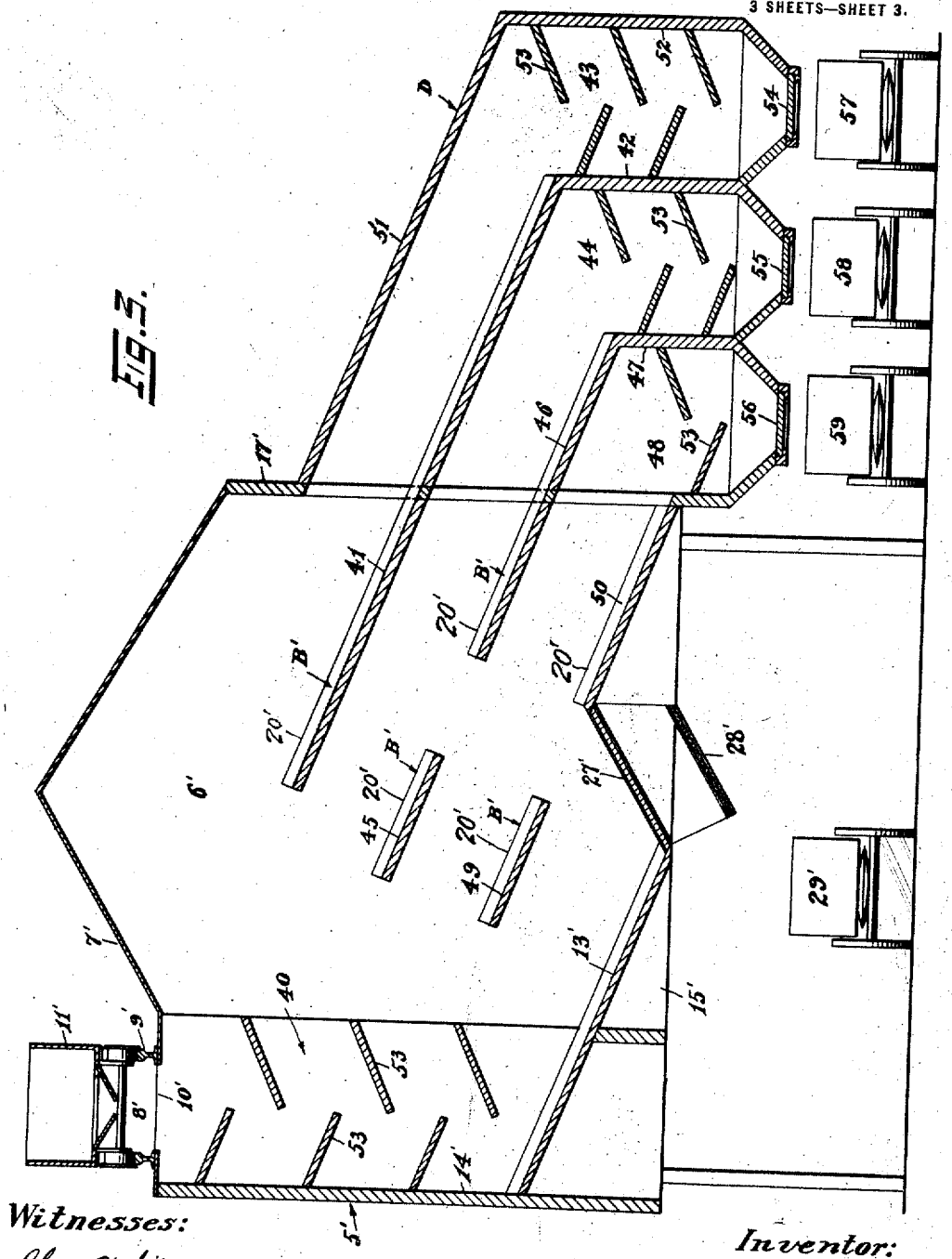
3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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COAL-STORAGE APPARATUS.

1,259,583. Specification of Letters Patent. Patented Mar. 19, 1918.

Application filed October 12, 1916. Serial No. 125,165.

To all whom it may concern:

Be it known that I, HENRY ADAMS, a citizen of the United States, residing in New London, in the county of New London and State of Connecticut, have invented certain new and useful Improvements in Coal-Storage Apparatus, of which the following is a specification.

This invention relates to coal bins or pockets, and more particularly to apparatus whereby the coal can be loaded and unloaded with the least injury to the coal.

In the storage of coal it has become quite a problem to so store the coal that the same can be handled with the least breakage to the coal. It has been found that, due to the weight of coal and the convenience of storing the same in piles of great altitude, the weight of the coal alone is sufficient to considerably fracture the pieces near the bottom; it has further been found that when in the removal of coal the same is drawn from the bottom, the rubbing and scraping of the pieces upon one another is accompanied with very detrimental results: and it has also been found out that when the coal is drawn from the top, the resulting avalanching of the coal pile will cause such scraping and rubbing of the pieces against one another that the undesirable fine coal is thereby produced in great quantity with the destruction of the better grades of large coal.

In view of the foregoing the present invention contemplates the provision of an apparatus, whereby the coal can with facility be stored in piles of great altitude, and the removal of the coal from such enormous piles be readily accomplished without the accompanying injurious action on the better grades of large coal. To this end, a storage bin is provided having a supply feed at one side for feeding the coal to the bin, a plurality of baffles in said bin which are disposed at various levels in said bin and of varying extent, on which and by means of which the coal is supported to relieve the lowerly situated portions of coal from the weight of the coal situated above it, and furthermore to decrease, if not entirely prevent the injurious results accompanying the avalanching of coal when the same is removed from the top, and a discharge member at the other end of the bin for the removal of the coal.

One of the main features of the present invention is the provision of the baffles in the bin.

These and other features, capabilities and advantages of the invention will appear from the subjoined description of specific embodiments thereof illustrated in the accompanying drawings, in which

Figure 1 is a sectional diagrammatic view illustrating the relative position of the main elements of one embodiment of the present apparatus.

Fig. 2 is a fragmental end elevation of the same.

Fig. 3 is a sectional diagrammatic view illustrating the relative position of the main elements of another embodiment of the present invention.

In the embodiment shown in Figs. 1 and 2 there is illustrated a main outer housing 5 inclosing a plurality of bins 6, disposed adjacent to one another, the bins being provided with a suitable common roof member 7 and having along their rear ends a trackway 8, between the rails 9 of which an opening 10 is provided, the trackway 8 being provided to accommodate a suitable coal carrier 11 by means of which the coal is carried to the bins. Each of the bins 6 is provided with a supply feed such as the spiral chute 12 of standard construction communicating with the opening 10. The spiral chute of each bin 6 extends from the opening 10 down to an inclined floor member 13 of the bin 6 in which it is located, the floor 13 in the present instance extending from the rear wall 14 of the bin approximately to the middle of the bottom 15 of the bin and at a greater angle than the natural repose inclination of the coal. The coal carriers 11 are provided with the usual opening floor members 16 whereby when opened the coal contained in such coal carriers, and when such coal carriers 16 are properly disposed over a chute 12, may conveniently be discharged onto such chute 12. As is well known with such chutes, the coal discharged thereon will gradually convey the coal down to the floor

member 13 and gradually pile the same up in the bin 6 without injuring the coal to any material extent.

At the front end of each bin there is formed a front wall member 17, in the present instance only extending over the right-hand half of such bin; the other half front portion of each bin is provided with the horizontally disposed cross pieces 18 which form the trackways for the slidable doors 19. These doors may be of any altitude and spaced a greater or less distance apart, to best suit the grade of coal to be stored and other conditions that may be encountered.

The construction forming the main feature of the present invention is the provision of the baffle plates now to be described. The baffle plates are intended to relieve the lower portions of coal of the weight of the coal disposed above the same, and, furthermore, to decrease, if not entirely prevent, the injurious effects resulting from the avalanching of coal. Each of the bins 6 is provided with a plurality of baffles, designated generally by the reference character B, which are spaced from one another and disposed at different levels to o e another. These baffles may either be of the same length or of different lengths, as illustrated in the present instance, to best suit the conditions encountered. In the presen. instance there is provided an upper elongated baffle plate 20 which extends from a point a little rearwardly of the middle of a bin 6 and in a downward direction, to the cross piece 18 second removed from the top. Below the elongated baffle plate 20 there is disposed a short baffle plate 21 extending from a point approximately below the middle of the baffle plate 20 downwardly in a forward direction to the cross piece 18 disposed below the cross piece to which the baffle plate 20 extends. Below the short baffle plate 21 there is another elongated baffle plate 22 similar in length and position to the baffle plate 20 and extending forwardly to a cross piece 18 disposed below the baffle plate 21. Below the baffle plate 22 there is again a short baffle plate 23, similar to the baffle plate 21, which extends rearwardly to the cross piece 18 disposed below the baffle plate 22, and below the baffle plate 23 there is another elongated baffle plate 24 and a short baffle plate 25, similar to the baffle plates 22 and 23, respectively, and also extending forwardly to cross pieces 18 disposed below one another. Below the baffle plate 25 there is the floor member 26, which extends from a point a little above the bottom 15 and a little forwardly of the front end of the floor member 13 downwardly to the lowermost cross piece 18 at the front of the bin 6. Between the rear end of the floor member 26 and the front end of the floor member 13 there is provided a doorway which may be provided with a suitable sliding door 27. Below the doorway 27 there is provided a screen 28 disposed at an inclination to the bottom 15 and spaced from the lower front end of the floor member 13. The arrangement of the floor member 13, door 27, and screen 27 is such that when the coal deposited on the floor member 13 is to be removed, the door 27 is opened, a coal conveyer 29 moved underneath the opening formed between the screen 28 and floor member 13 whereby the better grades of large coal slide from the floor member 13 against the screen 28 and then are deflected into the conveyer 29, while the fine coal and coal dust will drop through the screen 28 and not be discharged into the conveyer 29. The baffle-plates 20 to 25 inclusive and the floor members 13 and 26 preferably are disposed at a double angle relative to the front wall member 17, in the present instance the same being inclined downwardly from right to left looking at the front of the apparatus as shown by the line 20′ showing the upper edges of such baffles and downwardly in a forward direction, as clearly illustrated in Figs. 1 and 3. The inclination of the baffle-plates and floor members is preferably greater than the natural repose inclination of a pile of coal.

For removing the coal that may collect on the baffle-plates 20 to 25 inclusive and the floor member 26 the door members 19 will be opened and the coal then discharged into the chute E having the staggered manually inclined baffle-plates 30 and 31, to retard and break the force of the face of the coal, which are disposed in front of the cross pieces 18 and comprise a plurality of rear downwardly inclined partitions 30, the upper ends of which are disposed adjacent to the several cross-pieces 18, and the lower ends of which terminate in a line approximately the middle of the chute E; and the front downwardly inclined partitions 31, the upper ends of which are secured to the front wall 32 of the chute E, and the lower ends of which extend to a point approximately the middle of the distance between the lower ends of the two adjacent rear partitions 30.

The doors 19, as illustrated in Fig. 2, are each provided with a lever 33 which is pivotally connected to a bracket 34 disposed adjacent to a door 19 and having a slotted portion 35 engaging and coöperating with the pin 36 secured to the door 19. By means of these levers 33 the several doors may independently of one another be opened.

The operation of the foregoing apparatus is substantially as follows: The coal is fed to the several bins 6 by means of the coal conveyers 11 which discharge the coal onto the several spiral chutes 12, which spiral chutes 12 in turn discharge the coal into the bins 6, piling the same therein, first to cover

the floor member 13 and then the floor member 26, and so on upwardly so that the several baffles will each carry a portion of the coal. In this way it will be seen that the lower portions of coal will be relieved of the weight of the coal disposed above the same when the coal is being supplied to the bins 6. Preferably, of course, the doors 27 and 19 will be closed. After the bins have been filled and it is then desired to remove the coal, it will then be desirable to start the removal of the coal at the top. In other words, when removing the first load of coal the uppermost doors 19 will first be opened while the others are still closed, whereupon the coal that is disposed on the baffle 20 and rearwardly thereof will flow from the same into the chute E, the coal passing down the chute E by flowing from the several partitions 30 to the partitions 31 and back again to the partitions 30 until the same reaches the lowermost partition 37, from which it will be discharged into any suitable coal receptacle, such as the coal conveyer 38. After the coal has been removed from all of the baffles and the floor member 26, and it may then be desired to remove the coal from the floor member 13 as already explained, the door 27 may then be opened and coal flow from the floor member 13 to the screen 28 and then into the conveyer 29.

It will be seen from the foregoing that as the coal flows from the several baffles, it will not rub up against the portions or heaps of coal above the same; that furthermore the coal will not be subjected to the injurious avalanching effect which is particularly disastrous when coal flows down from a very high pile of coal; and that still furthermore the lower portions of coal will not be subjected to the enormous strain of supporting all of the upper portions of coal.

The embodiment illustrated in Fig. 3 comprises essentially a main outer housing 5′ inclosing a plurality of bins 6′ similar to the embodiment illustrated in Fig. 1, the bins being provided with a suitable common roof member 7′ and having along their rear ends a trackway 8′ to accommodate a coal carrier 11′, between the rails 9′ of which an opening 10′ is provided. Each of the bins 6′ in the present embodiment is provided with a chute 40, having the inwardly inclined staggered baffle plates 53. And such chute 40 extends down to an inclined floor member 13′ extending from the rear wall 14′ of a bin approximately to the middle of the bottom 15′ thereof, and at a greater angle than the natural repose inclination of the coal. By means of the retardation and baffling of the falling coal in its passage by gravity down the chute 40, as is well known in the art, the coal will be piled up in the bins 6′ with very little if any injury to the coal.

The front of each of the bins 6′ is provided with a front wall member 17′ similar to the wall member 17 of the embodiment illustrated in Fig. 1, which wall member 17′ forms a closure for but one-half side of each bin, the other half being equipped with the coal discharging means D.

The chute 40 aforesaid, together with the discharge means and coal baffle-plate about to be described of the present embodiment, form the main variations from the embodiment illustrated in Fig. 1. The baffle-plate of the present embodiment, designated generally by B′ comprises essentially an upper baffle plate 41 which extends from a point substantially the middle of the bin 6′, and is inclined toward what is the front of Fig. 3, as indicated by the rear side line 20′ of the baffle-plates then forwardly in a downward direction through and beyond the wall member 17′ to the vertical partition 42 formed between the discharging chutes 43 and 44. Below the baffle-plate 41, and substantially parallel thereto, there is formed an auxiliary baffle-plate 45 which begins a little rearwardly of the baffle-plate 41 and terminates a little forwardly of the rear end of the baffle plate 41. Below the baffle-plate 41, spaced apart from, but in alinement with, and therefore substantially forming a continuation of, the baffle-plate 45, is disposed the baffle-plate 46 which extends parallel with the baffle plate 41 and through the wall members 17′ to the vertical partition 47 formed between the discharging chutes 44 and 48. Below the auxiliary baffle plate 45 and parallel thereto, there is formed an auxiliary baffle plate 49 beginning a little rearwardly of the rear end of the baffle plate 45 and terminating a little rearwardly of the front end of the baffle plate 45. Below the baffle plate 46, spaced from, but in alinement with, and therefore substantially forming a continuation of, the auxiliary baffle plate 49, there is formed the floor member 50 which extends to the wall member 17′ and constitutes the rear wall member of the chute 48.

The baffle plates 41, 45, 46, 49 and floor members 13′ and 50 all have a double inclination similar to the baffle plates 20 to 25 inclusive of the embodiment illustrated in Fig. 1, that is, inclining downwardly from right to left looking at the front of the bins 6′, downwardly from the rear to the front of the bins 6′, and at an inclination greater than the natural repose inclination of coal, as indicated by the line 20′.

The rear end of the floor member 50 is disposed a little forwardly of the front end of the floor member 13′ between which there is formed a doorway provided in the present instance with the sliding door 27′. Below the sliding door 27′ and substantially parallel thereto is formed the screen 28′. The

relative positions of the floor member 13′, door way and screen 28′, is such that the coal disposed on the floor member 13′ may flow therefrom, when the door 27′ is opened, onto the screen 28′, whereupon the dust and fine coal is passed through such screen 28′ and the large coal deflected into the coal conveyer 29′ disposed adjacent to said screen 28′.

Forming the roof of the discharging member is an inclined roof member 51 which extends from the wall member 17′ to the outer wall member 52 of the chute 43. The chutes 40, 43, 44 and 48 are each provided with partitions 53 in staggered relation to one another and inclined to one another, these partitions being arranged similar to the partitions of the chute E of the embodiment illustrated in Fig. 1.

The discharge mouths of all the chutes 43, 44, and 48 are substantially in alinement with one another and at one level, and provided with the doors 54, 55 and 56, respectively. After the coal has been fed into the bins 6′, the same will at the same time fill up and locate on the baffle plates 41 and 46 and fill up the chutes 43, 44 and 48 to rest upon the doors 54, 55 and 56. When it is desired to remove any of the coal, in practice it has been found desirable to first open the door 54 and permit all of the coal disposed in the chute 43, on the baffle plate 41 and in the rear thereof to discharge therefrom into the coal conveyer 57 disposed therebelow. Then the door 55 may be opened and the coal discharged into the conveyer 58, then the door 56 opened and the coal discharged into the conveyer 59, and then to remove the coal from the floor member 13′, the door 27′ opened and the coal discharged into the conveyer 29′.

The embodiment illustrated in Fig. 3 presents substantially the same advantages as the embodiment illustrated in Fig. 1 so far as concerns relieving the weight from the lower portions of coal and preventing the injurious avalanching effects. In addition to the foregoing, however, the embodiment illustrated in Fig. 3, due to the spaces formed between the auxiliary baffle plates and the main baffle plates, relieves the wall member 17′ of the major portion of the weight as is the case with the embodiment illustrated in Fig. 1, and in addition, due to the independent chutes, one for each baffle level, provides a very simple arrangement compared to the arrangement of doors 19 illustrated in Fig. 2.

It is obvious that various changes and modifications may be made to the details of construction without departing from the general spirit of the invention.

I claim:—

1. In a coal storage apparatus, the combination of a bin having a series of outlet openings disposed one above the other in one wall of the bin; a spiral means for discharging coal into said bin at a part remote from said openings; and a plurality of baffles disposed across said bin one above the other and sloping from said part toward said openings at a slope greater than the angle of repose of coal thereon.

2. In a coal storage apparatus, the combination of a bin having a series of outlet openings disposed one above the other in one wall of the bin; means for discharging coal into said bin at a part remote from said openings; and a plurality of baffles disposed across said bin one above the other and sloping from said remote part toward said openings at a slope greater than the angle of repose of coal thereon, the upper edges of the baffles terminating a remote distance away from said part of the bin into which the coal is discharged.

3. In a coal storage apparatus, the combination of a bin having a series of outlet openings disposed one above the other in one wall of the bin; means for discharging coal into said bin at a part remote from said openings; a plurality of baffles disposed across said bin one above the other and sloping from said remote part toward said openings at a slope greater than the angle of repose of coal thereon; and a chute disposed against said openings and comprising inwardly inclined staggered partitions between which coal is discharged from said openings.

4. In a coal storage apparatus, the combination of a bin having a series of outlet openings disposed one above the other in one wall of the bin; means for discharging coal into said bin at a part remote from said openings; and a plurality of baffles disposed across said bin one above the other and sloping from said remote part toward said openings at a slope greater than the angle of repose of coal thereon, some of the baffles being shorter than others.

5. In a coal storage apparatus, the combination of a bin having a series of outlet openings disposed one above the other in one wall of the bin; means for discharging coal into said bin at a part remote from said openings; and a plurality of baffles disposed across said bin one above the other and sloping from said remote part toward said openings at a slope greater than the angle of repose of coal thereon, alternate baffles being shorter than the others.

6. In a coal storage apparatus, the combination of a bin having a series of outlet openings disposed one above the other in one wall of the bin; and a chute disposed against said openings and comprising inwardly inclined staggered partitions between which coal is discharged from said openings.

7. In a coal storage apparatus, the com-

bination of a bin having an opening in one side; a means for discharging coal into the bin at a part remote from said side; a floor member in the bin sloping from the part in which coal is discharged to an intermediate part of the bin; a second floor member sloping to said opening and having its upper end disposed near and higher than the lower end of the first named floor member; and a door provided between the lower end of the first named floor member and the upper end of the second floor member.

8. A coal storage apparatus comprising a plurality of bins, a spiral chute at the entrance to each bin for receiving the coal to supply the same to the bin, a staggered chute at the discharge end of each bin for receiving the coal discharged from the same, and a plurality of baffles disposed in each bin for receiving the coal as it is supplied by the spiral chute thereby to relieve the lower portions of coal of the weight of the upper portions of coal and to protect the coal from the serious injuries due to avalanching.

9. A coal storage apparatus comprising a plurality of bins, a spiral chute at the entrance to each bin for receiving the coal to supply the same to the bin, a staggered chute at the discharge end of each bin for receiving the coal discharged from the same, a plurality of baffles disposed in each bin for receiving the coal as it is supplied by the spiral chute thereby to relieve the lower portions of coal of the weight of the upper portions of coal and to protect the coal from the serious injuries due to avalanching, and doors disposed adjacent to each baffle and coöperating between the baffles and the chute for discharging the coal from the baffles to the chute independently of one another.

10. A coal storage apparatus comprising a plurality of bins, a spiral chute at the entrance to each bin for receiving the coal to supply the same to the bin, a staggered chute at the discharge end of each bin for receiving the coal discharged from the same, a plurality of baffles disposed in each bin for receiving the coal as it is supplied by the spiral chute thereby to relieve the lower portions of coal of the weight of the upper portions of coal and to protect the coal from the serious injuries due to avalanching, a plurality of doors one adjacent to each baffle, and levers for actuating said doors so that the doors may be actuated independently of one another.

11. A coal storage apparatus, means for supplying coal thereto, a plurality of baffles disposed in said apparatus and positioned to receive the coal from said supplying means, there being a discharge end plate for each of said baffles, the ends of the baffles removed from the supplying means coöperating with the discharge ends to permit the discharge of coal from the baffles, the baffles being disposed at a double angle of inclination inclining downwardly from one side to the other and also from the supplying means downwardly toward the discharge end.

12. A coal storage apparatus, means for supplying coal thereto, a plurality of baffles disposed in said apparatus and positioned to receive the coal from said supplying means, there being a discharge end plate for each of said baffles, the ends of the baffles removed from the supplying means cooperating with the discharge ends to permit the discharge of coal from the baffles, the baffles being disposed at a double angle of inclination inclining downwardly from one side to the other and also from the supplying means downwardly toward the discharge end, the angle of inclination of said baffles being greater than the natural repose inclination of the coal.

13. A coal storage apparatus having a supply opening at one end and a discharge at the opposite end thereof, a plurality of baffles disposed in said apparatus of varying length in position to receive the coal from said supply opening and coöperating with the discharge to permit the discharge of the coal from such discharge, the baffles extending to said discharge.

14. A coal storage apparatus having a supply opening at one end and a discharge at the opposite end thereof, a plurality of baffles disposed in said apparatus of varying length in position to receive the coal from said supply opening and coöperating with the discharge to permit the discharge of the coal from such discharge, the several baffles being of different lengths to best suit the conditions encountered and extending to the discharge.

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