Aug. 25, 1931. H. N. EAVENSON 1,820,381

APPARATUS FOR TAKING SAMPLES OF COAL AND THE LIKE

Filed Sept. 5, 1928 3 Sheets-Sheet 1

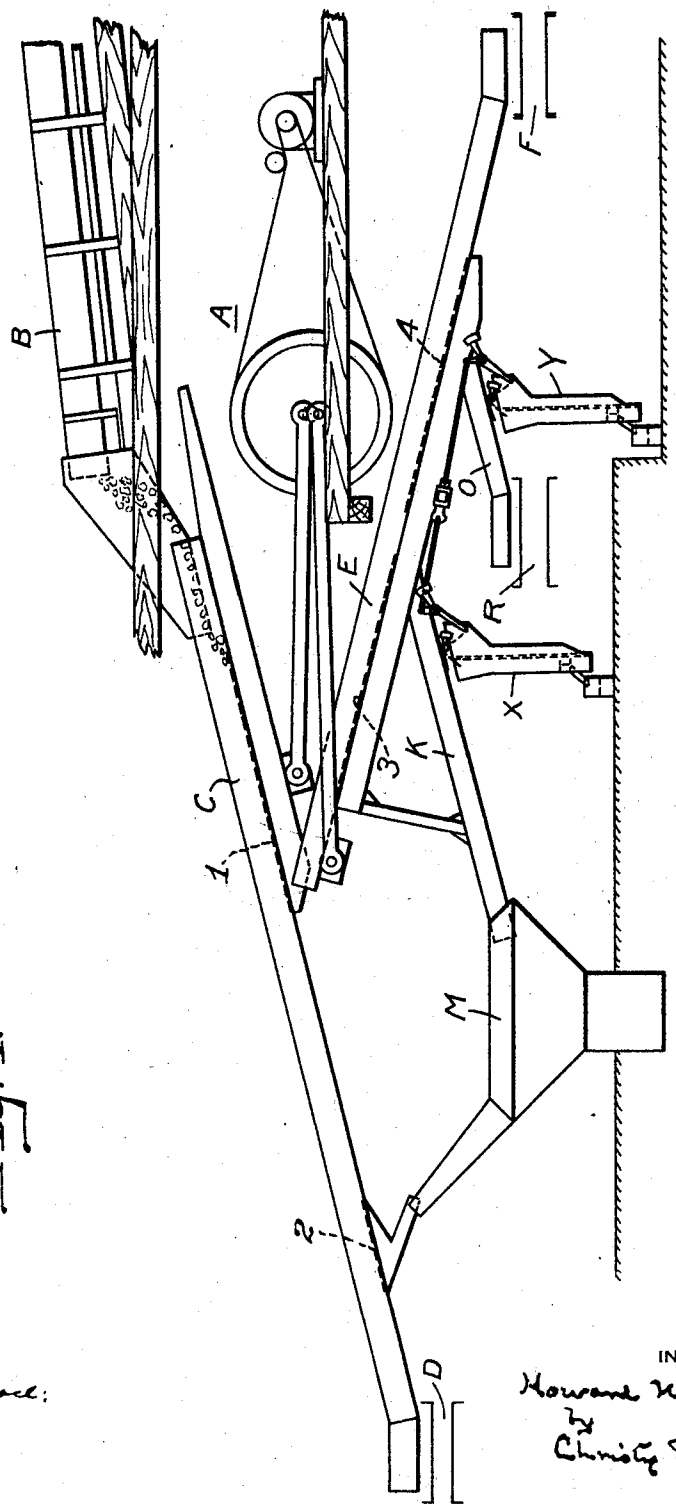


Fig. 1.

WITNESS
A B Wallace.

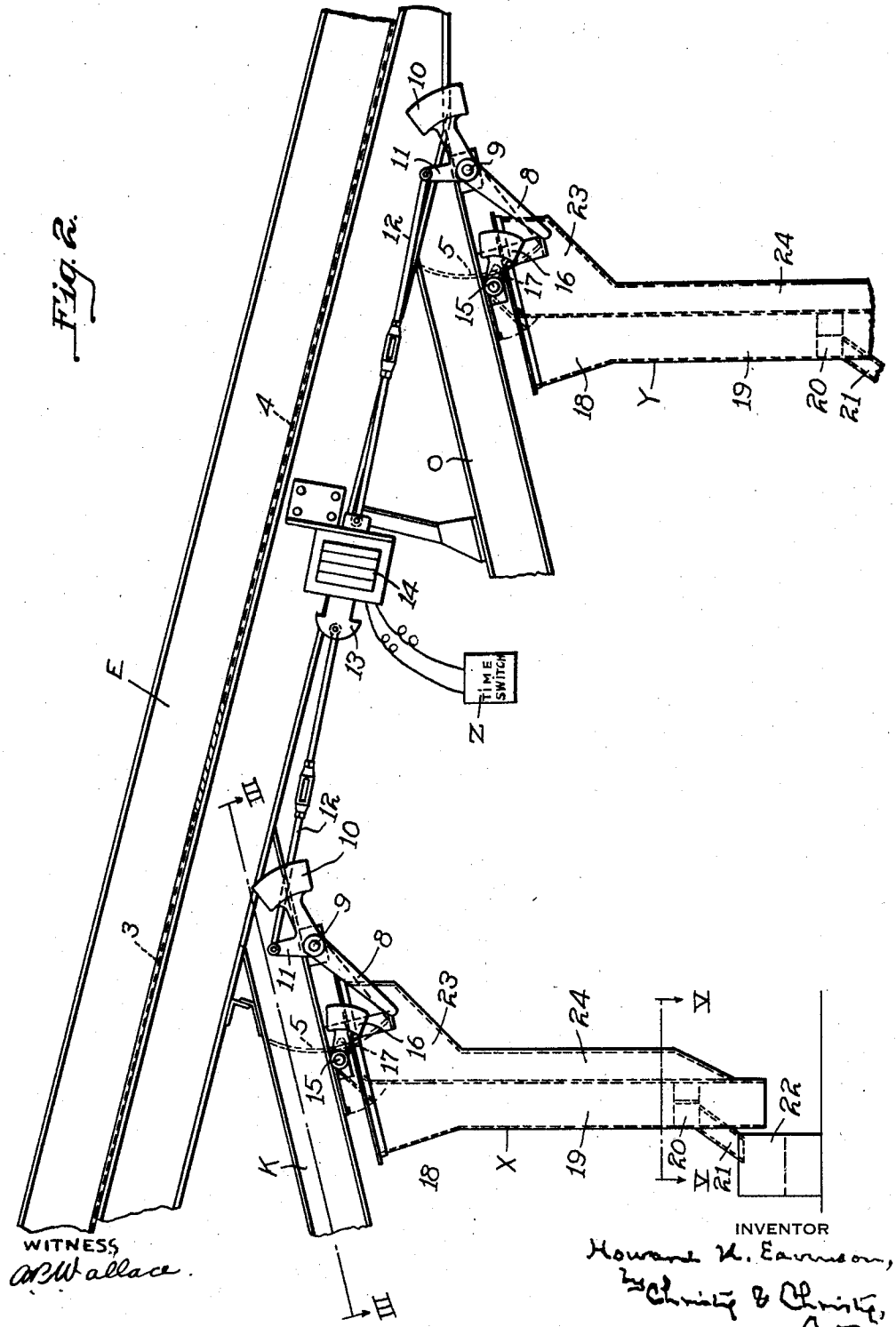
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Fig. 2.



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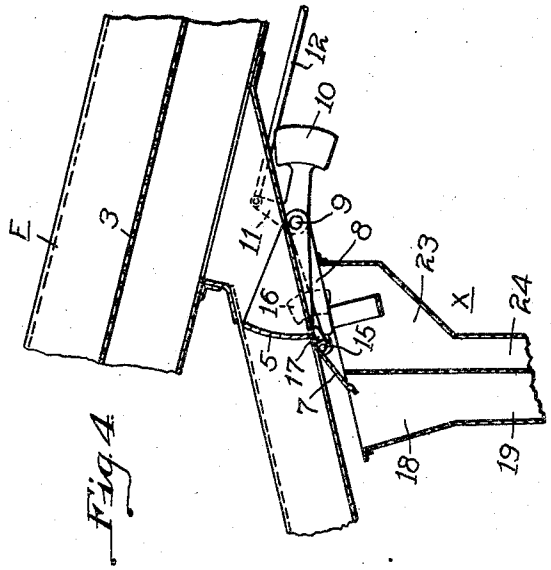


Fig. 4

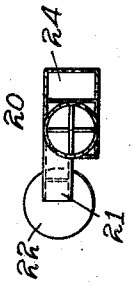


Fig. 5

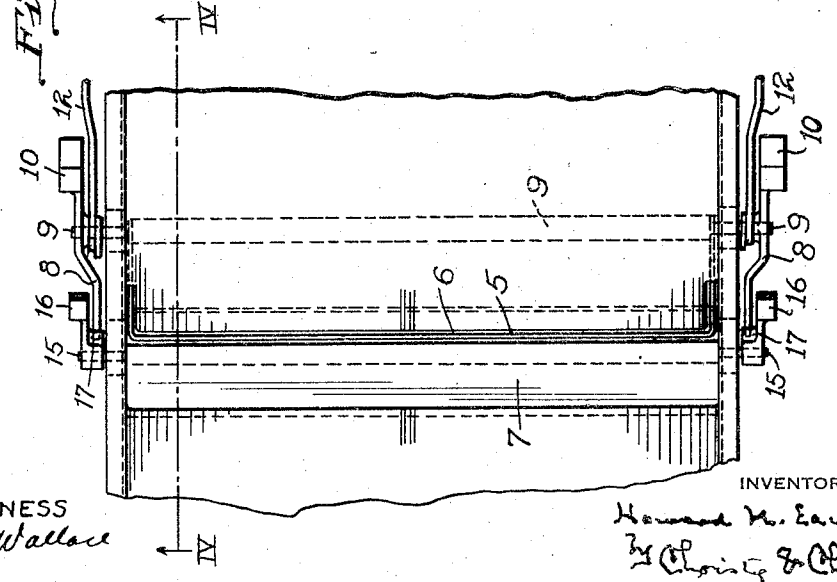


Fig. 3

WITNESS
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Patented Aug. 25, 1931 1,820,381

UNITED STATES PATENT OFFICE

HOWARD N. EAVENSON, OF PITTSBURGH, PENNSYLVANIA

APPARATUS FOR TAKING SAMPLES OF COAL AND THE LIKE

Application filed September 5, 1928. Serial No. 304,117.

Apparatus embodying this invention may be used for taking samples of a variety of broken or granular substances, but it is particularly adapted for taking samples of coal while in the process of being screened and classified or graded according to size. It can be operated automatically and at predetermined intervals of time, if desired, and at each operation will take a representative sample of the mass at the particular moment. It can also be arranged in single units, or in multiple to simultaneously withdraw samples from different portions and therefore from different grades of the mass being screened.

In the accompanying drawings Figure 1 is a side elevation of a conventional coal screen, showing one embodiment of the invention. Figure 2 is a like view, on a larger scale, of a portion of the apparatus shown in Figure 1. Figure 3 is a fragmentary plan view taken on the line III—III of Figure 2. Figure 4 is a sectional elevation taken on the line IV—IV of Figure 3, showing the parts in sample-taking position. Figure 5 is a cross-section taken on the line V—V of Figure 2.

Referring first to Figure 1, the shaking mechanism A may be of any usual or suitable type and need not be described here. The coal to be classified runs from the delivery chute B to the primary screening chute C. In the chute C it first runs over the screen 1, which is of the proper mesh, or has openings of the proper size, to pass the slack and the smaller grades and retain only the lump coal. This lump coal passes on down the chute C, over a second screen 2 for slack, to a conveyor or other place of deposit D. The slack and the smaller grades of the coal fall through the screen 1 into the second chute E in which there are arranged in succession the fine screen 3 for the slack, the coarser screen 4 for the nut coal, and at the end of the chute the conveyor F for the egg coal. The slack falls through the screen 3 into the chute K leading to the slack-bin M. The nut coal falls through the screen 4 into the chute O leading to the conveyor R. The chutes B, C, E, K and O are of the type usual in coal-screening and delivery apparatus, usually slightly inclined, and having flat bottoms or floors of considerable width.

Apparatus embodying the present invention is shown in two units in connection with the chutes K and O, for the taking of samples, respectively, of the slack and of the nut coal.

Each of these units, X for the slack, and Y for the nut coal, includes a stop-gate 5 working in a transverse slot 6 extending across the floor of the chute, and a trap-door 7 formed in the floor back of and adjacent to the slot 6 and also extending the entire width of the chute. The opposite ends of the gate 5 are connected to the arms 8 on the opposite ends of the transverse rock-shaft 9 mounted beneath the floor of the chute, and connected to the arms 8 (or to the rock-shaft) are the rearwardly projecting weighted arms 10, and the upwardly projecting arms 11, the latter being loosely connected by the rods 12 to the ends of the cores 13 of the solenoids 14 on the opposite sides of the chute. The trap-door 7 is connected at its edge to a second transverse rock-shaft 15 having the weighted arms 16 at its opposite ends. Upon the arms 16 are fingers 17 which project inwardly into the path of movement of the tips of the arms 8 when the latter are swung upwardly by the rocking of the shaft 9.

The units X and Y are of identical construction, the arms 11 of the units being connected by the rods 12 to the opposite ends respectively of the cores 13 of the solenoids 14, as shown on one side of the chute E in Figure 2.

The solenoids 14 on the opposite sides of the chute are operated in unison through a single controller, and constitute in effect a single motor. For operating the solenoids it is preferred to employ a magnetic switch, which is controlled in turn by a suitable timing device which can be set to throw the switch at any predetermined time intervals, rendering the operation entirely automatic. Mechanism of this character is well known and specific description thereof is unnecessary. It may be contained in the box Z shown

in Figure 2. While automatic operation is preferred, it will be understood that the motor may be controlled manually if desired.

When the trap-door 7 is opened the coal resting on the door at the time, and for the entire width of the chute, is discharged into the hopper 18 and thence through the well 19 (Figure 2) and quartering device 20, Figure 5. From one compartment of the quartering device 20 a chute 21 leads to the sample-box 22, where a portion of the sample taken is collected. The balance of the sample, together with any dribble which may fall through supplemental hopper 23 and conduit 24, will be caught in a car or bin beneath the open lower end of the well 19.

In operation the coal in a loose, ungraded mass is delivered from the chute B into the chute C spread out laterally into a wide and relatively shallow stream resting upon the flat floor of the chute. The reciprocation of the chute C by the shaking mechanism A, of any well known or suitable type, serves to propel the stream along the chute C while at the same time keeping the coal in a state of agitation so as to facilitate the falling out of the finer grades through the successive screens 1 and 2 which form sections of the floor of the chute. The primary or advance screen 1 has meshes or openings of such size as to permit all sizes of the coal except the largest graded size desired (usually called lump coal) to fall through the screen 1 into the chute E immediately beneath it. The secondary or rear screen 2 is provided in order that any slack still entrained with the coal lumps may be dropped through it and flow into the slack-bin M. The graded lump coal is then caused to flow onward to the conveyor D, by which it is transported to the point of deposit.

The mass of the finer grades of coal which falls through the screen 1 upon the floor of the chute E is separated and graded, under propulsion and agitation by the shaking mechanism A, in the course of passage over the successive screens 3 and 4 to the conveyor F. The slack falls through the screen 3 upon the floor of the chute K which leads to the slack-bin M; the next coarser grade, herein called nut coal, falls through the screen 4 upon the floor of the chute O which leads to the conveyor R; and the so-called egg coal passes on to the conveyor F.

The construction of the units X and Y, for taking samples of the coal in the chutes K and O respectively, has been explained above. Each unit is placed intermediately of the length of the floor of its chute, the transverse slot 6 and stop-gate 5 in advance or toward the inner end of the chute, and the trap-door 7 at the rear of the gate or toward the delivery end of the chute. Each slot 6, gate 5 and door 7 extends transversely across the floor of the chute for substantially its entire width, and the door 7 when closed constitutes an intermediate section of the floor of its chute.

In the position of the parts shown in Figure 2 of the drawings the solenoid coils 14 on opposite sides of the chute E are supposed to be energized, having drawn the cores 13 to the left, thus having elevated the weighted arms 10, thereby maintaining the gates 5 in their depressed or lowered position, and allowing the weighted arms 16 to drop, thus maintaining the trap-doors 7 in their upper or closed position, forming an intermediate part of the flat floors of the respective chutes K and O. Upon the operation of the time-controlled magnetic switch in box Z, the coils of the solenoids on the opposite sides of the chute E are de-energized and the cores 13 and the links 12 thrown to the right by the release of the weighted arms 10. By this operation the parts are brought to the position shown in Figure 4, with the stop-gates 5 elevated through their slots 6 in the floors of the respective chutes K and O. In this operation the upward movement of the arms 8 has caused them to engage the pins 17 on the weighted arms 16, thereby turning the rock-shafts 15 and opening the trap-doors 7 downwardly. By the opening of each of the doors 7 there is automatically obtained, from a zone intermediate of the length of the chute extending transversely substantially the entire width of its floor and to the full depth of the stream of coal, a sample altogether representative of the coal passing over the floor at the time. While each sample is being taken the elevated gate 5 holds back the oncoming stream. Upon the reverse operation of the time-controlled magnetic switch Z, the parts are automatically restored to the position shown in Figure 2.

It will be understood that the specific mechanism herein described may be considerably varied without departing from the invention.

The novel method of taking samples which is carried out by the apparatus herein described forms the subject-matter of another application for Letters Patent filed by me on October 5th, 1929, Serial No. 397,565.

I claim as my invention:

1. In apparatus of the class described the combination with a chute having a transversely slotted flat supporting floor for the stock, of a vertically movable gate arranged to be elevated and lowered in said slot, a trap-door hinged transversely of said floor in the rear of said slot and gate, said door extending transversely across said floor and forming an intermediate section thereof when in closed position, means for maintaining said trap-door normally in closed position, means for elevating said gate, and means operated by said gate-elevating means for opening said trap-door.

2. In apparatus of the class described the combination with a chute having a transversely slotted flat supporting floor for the stock, of a vertically movable gate arranged to be elevated and lowered in said slot, a trap-door hinged transversely of said floor in the rear of said slot and gate, said door extending transversely across said floor and forming an intermediate section thereof when in closed position, and means for operating in reverse said gate and said trap-door.

In testimony whereof I have hereunto set my hand.

HOWARD N. EAVENSON.