Nov. 23, 1937. J. C. WHITE 2,100,178

COAL MINING MACHINE

Filed May 11, 1936 3 Sheets-Sheet 1

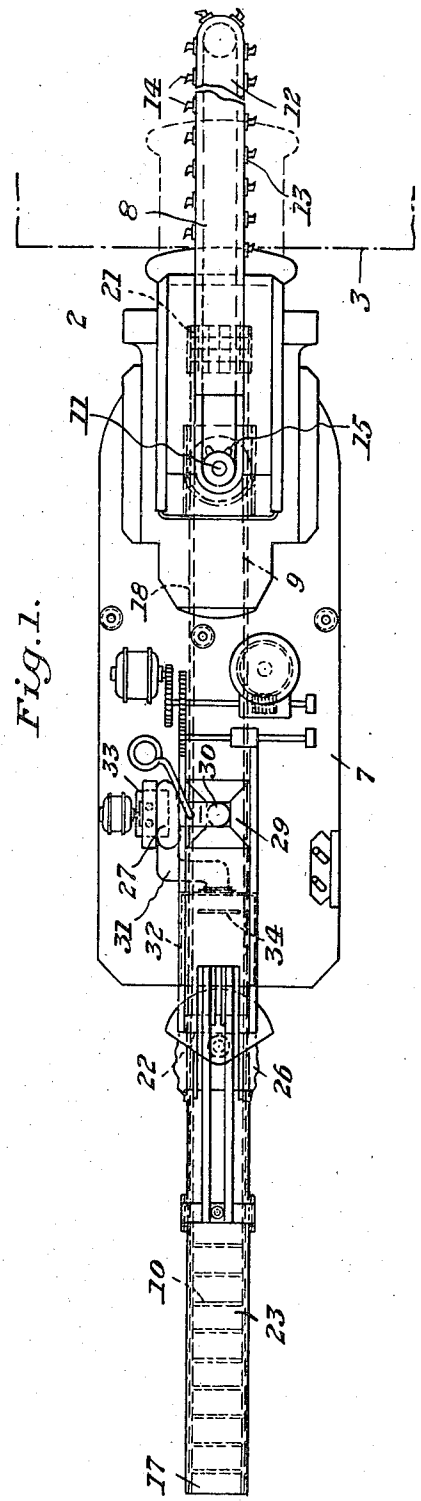


Fig. 1.

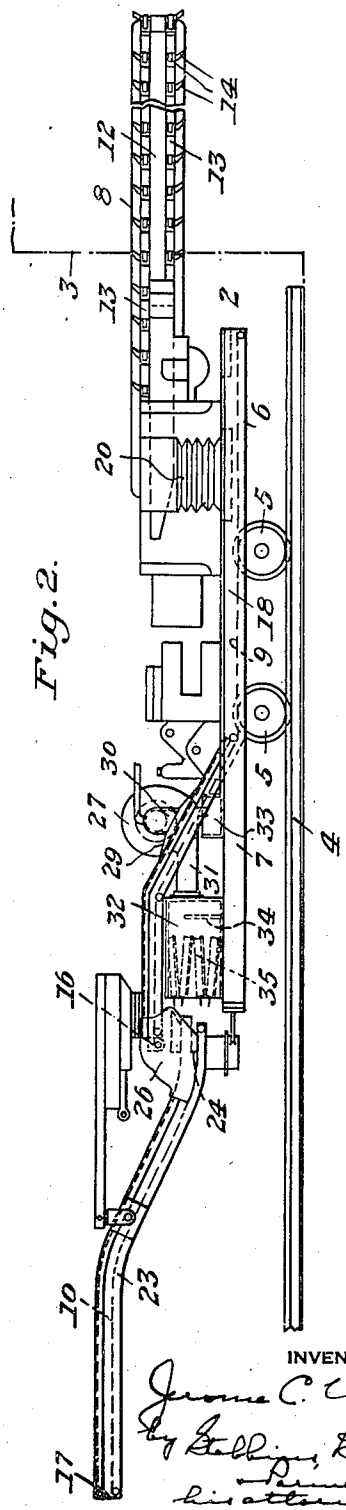


Fig. 2.

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COAL MINING MACHINE

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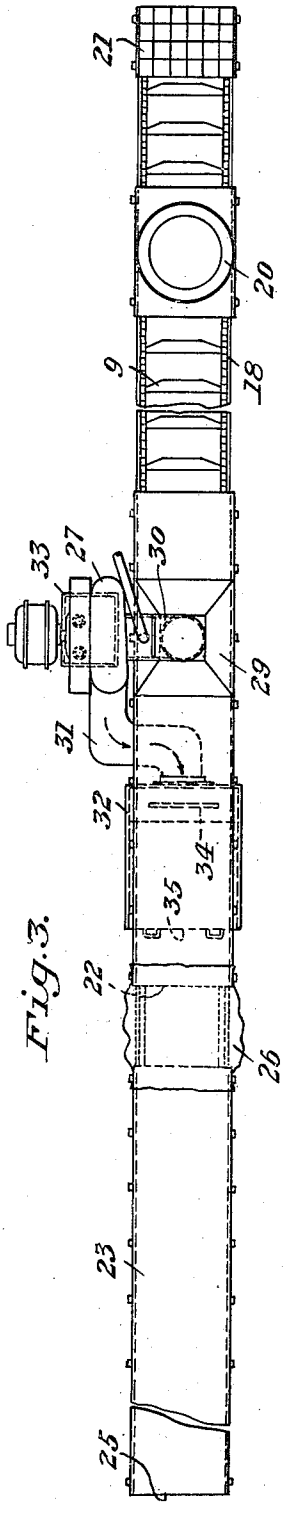


Fig. 3.

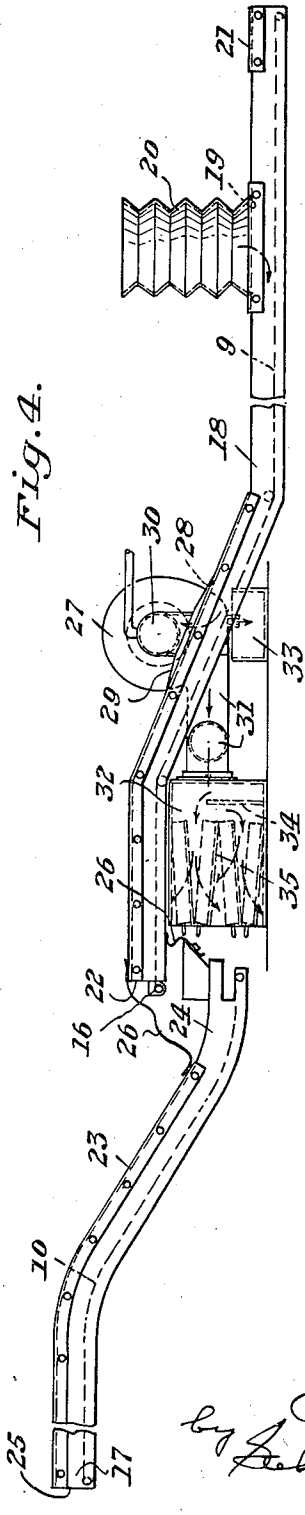


Fig. 4.

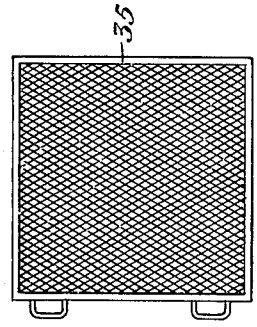


Fig. 6.

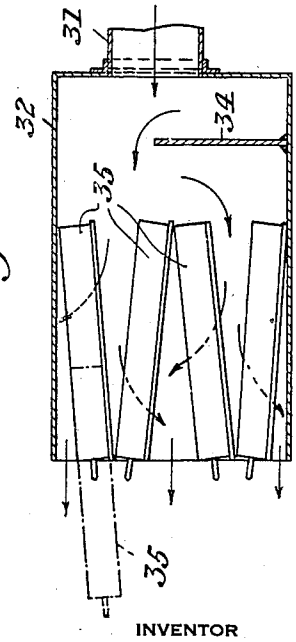


Fig. 5.

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COAL MINING MACHINE

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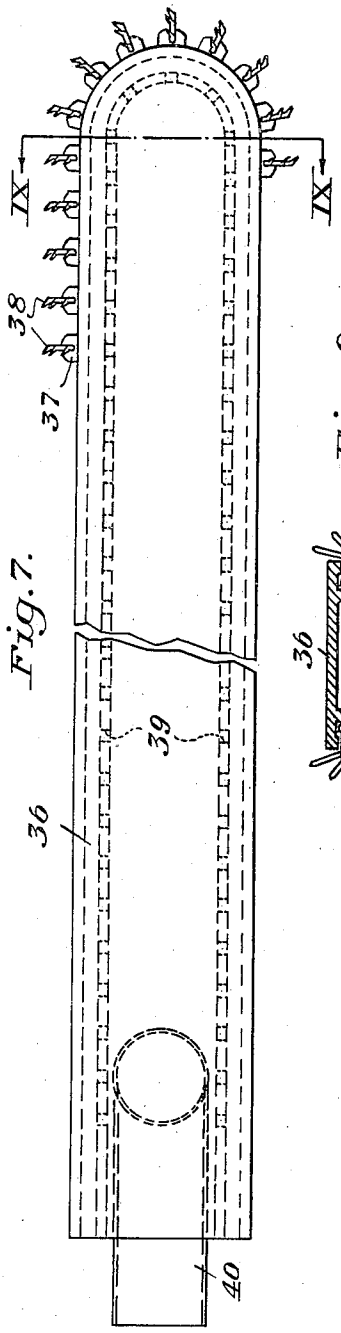


Fig. 7.

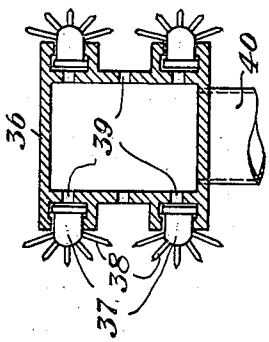


Fig. 9.

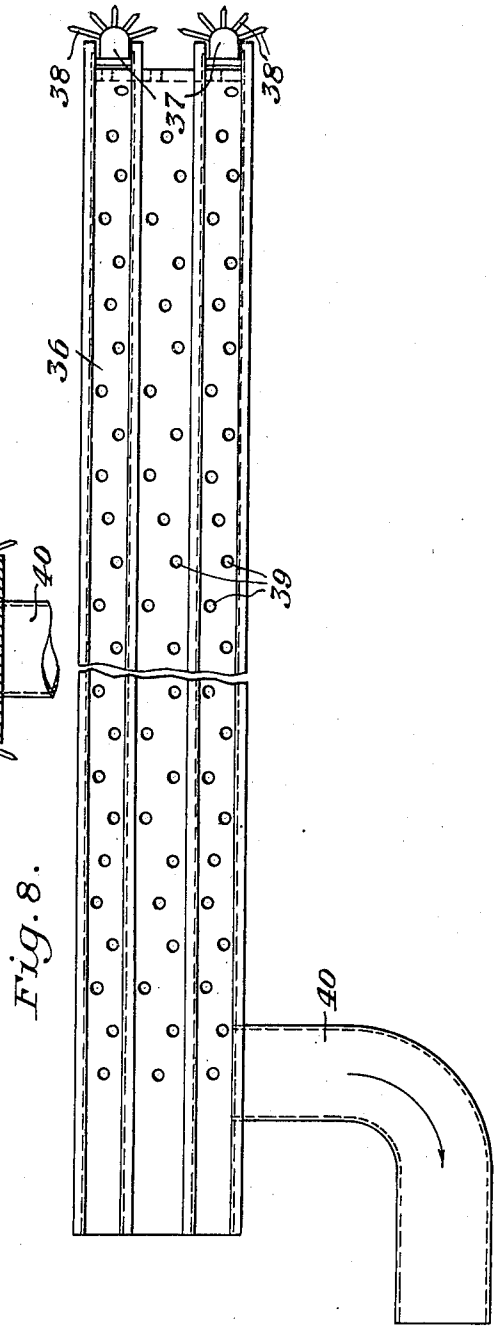


Fig. 8.

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2,100,178

UNITED STATES PATENT OFFICE

2,100,178

COAL MINING MACHINE

Jerome C. White, Pittsburgh, Pa., assignor to Pittsburgh Coal Company, Pittsburgh, Pa., a corporation of Pennsylvania

Application May 11, 1936, Serial No. 79,022

11 Claims. (Cl. 262—28)

This invention relates to coal mining machines. It has to do primarily with the control of the atmosphere in and about the machine so as to materially improve the working conditions to which the workmen are subjected, and it also results in longer life of the machine and a cleaner and hence more desirable product.

It is a well known fact that in the mining of coal small particles of such size as to be suspended in the atmosphere are produced. These particles and such other particles as may readily be handled pneumatically are herein referred to as "dust". The dust produced in coal mines may come either from the coal or from the strata encountered adjacent veins of coal. Certain types of dust encountered in coal and other mines are deleterious to the health of the miners, and certain types of dust create great danger due to explosions and fires.

As an example of a dust which is unhealthy and disagreeable, the dust created by silicate formations may be mentioned. This dust when breathed by the miners becomes deposited in the miners' lungs and may result in silicosis, a distressing and painful disease.

Certain veins of coal are found adjacent silicate veins and it is impossible to properly mine such coal without creating substantial quantities of the undesirable and injurious silicate dust. Various methods of alleviating the condition thus produced have been proposed but none has been practical. The dust cannot be removed by the mine ventilating system and the cost of removing it through ventilation of the mine would be prohibitive. It is not practicable to equip the miners with masks, as these interfere with the miners' work and greatly reduce their efficiency. Moreover, a mask is only effective for a limited time and would not be practicable for this purpose.

Extended research into ways and means of alleviating the undesirable and dangerous conditions arising due to dust in mines has been carried on by my assignee, Pittsburgh Coal Company, and others, and as a result of my work for Pittsburgh Coal Company I have come to the conclusion that the only practicable way of removing dust from mines is by doing so by suction at or near the source of the dust. The problem is considerably complicated when mechanical mining and loading apparatus is used, as the coal cut from the working face is handled or conveyed by such machinery, which results in the creation of additional dust and the stirring up or circulation of the dust previously created.

I have found that the best results are obtained by confining or substantially confining the cut coal as soon as practicable after it is removed from the working face of the mine and withdrawing the dust from the coal while it is so confined. This may be accomplished in various ways and when conveyors are used I preferably substantially enclose the same and withdraw the dust by suction from the enclosure. I prefer to provide ducts about the conveyors and to withdraw the dust along such ducts.

The dust may be withdrawn by any suitable suction device and I find a rotary air pump to be particularly desirable, as such a device furnishes a ready way of precipitating the dust particles from the air carrying them so that the air free or substantially free from dust particles may be discharged back into the mine. In addition to withdrawing dust from the enclosures above mentioned I also preferably provide for withdrawing it from the atmosphere surrounding the apparatus. This further assists in keeping the air pure and also lengthens the life of the machinery.

Other details, objects and advantages of the invention will become apparent as the following description of certain present preferred embodiments thereof proceeds.

In the accompanying drawings I have shown certain present preferred embodiments of the invention, in which

Figures 1 and 2 are, respectively, a plan view and an elevational view, mainly diagrammatic, of a coal cutting and loading machine;

Figures 3 and 4 are, respectively, a plan view and an elevational view, to enlarged scale and with portions cut away, of the dust removing mechanism with which the machine shown in Figures 1 and 2 is equipped;

Figure 5 is a vertical longitudinal cross-sectional view through a portion of the mechanism shown in Figure 4;

Figure 6 is a plan view of a dust removing tray shown in Figure 5;

Figure 7 is a plan view with a portion cut away of a coal cutting head;

Figure 8 is an elevational view of the cutting head shown in Figure 7; and

Figure 9 is a vertical transverse cross-sectional view taken on the line IX—IX of Figure 7.

Referring now more particularly to the drawings, reference number 2 designates the interior of a coal mine in which coal is being removed from the working face 3. The mine is provided with the usual tracks 4 on which is carried by

wheels 5 a cutting and loading machine designated generally by reference numeral 6 and whose function is to cut coal from the working face and convey the same to the rear where it is loaded directly into a suitable receptacle such as a mine car positioned on the track 4. The machine shown is of the well known Goodman type, and so far as the mechanical features of the machine are concerned these do not form per se the present invention, and the mechanical details of the machine will therefore not be described except in a general way and so as to enable a complete understanding of the invention and its application.

The machine comprises a base 7 which is suitably carried on the wheels 5, a cutting head 8 mounted at the forward end of the machine and conveyors 9 and 10 for conveying the cut coal to the rear and delivering it into a mine car. The cutting head 8 is mounted, as well known in the art, to swing or pivot about the point 11 and is also vertically adjustable. It comprises a frame 12 about which operates an endless cutter chain 13 equipped with cutters 14 and driven by a sprocket 15. The cutter chain operates in the counter-clockwise direction viewing Figure 1.

When the machine is in use the cutting head is advanced into the working face as shown in Figure 1, the cut coal being carried rearwardly of the machine and discharged onto the conveyor 9, which is shown as being an endless conveyor. The conveyor 9 discharges at its rearward end at 16 onto the conveyor 10, which is likewise shown as being an endless conveyor, and which discharges at its rearward end 17 into the mine car or the "gob". The mechanism for driving and operating the various parts of the machine is of standard construction and well known in the art.

The conveyor 9 is substantially enclosed by a duct 18, which may be of suitable material such as sheet metal, and which substantially completely surrounds the conveyor transversely thereof. The duct 18 has in its top an opening at 19 and extending between such opening and the rear end of the cutting head 8 is an expansible and retractible enclosing means 20 similar to an accordion but hollow from end to end. The bottom of the enclosing means 20 is sealed about the opening 19 in the duct 18 and the cuttings from the cutting head 8 pass downwardly through the means 20 onto the conveyor 9 in the duct 18. The duct 18 also has an opening in its top at its forward end, as shown at 21, which opening may be covered with a heavy mesh screen, as shown in Figure 3. The rear end of the duct 18 is open, as shown at 22, to permit the conveyor 9 to discharge its contents onto the conveyor 10.

The conveyor 10 is surrounded transversely by a duct 23 which is open at its forward end at 24 to receive the material discharged by the conveyor 9 and which is open at its rear end at 25 to discharge the material into the mine car or to the gob pile. The ducts 18 and 23 are substantially sealed together by flexible material 26, which, however, permits relative movement therebetween and between the respective conveyors 9 and 10.

A rotary air suction pump is provided, such pump being shown at 27. An opening is provided at 28 in the top of the duct 18, a hood 29 being sealed to such opening and communicating through a duct 30 to the inlet portion of the pump 27. The pump 27 may be of standard construction and discharges peripherally into a duct 31, which, in turn, discharges into a screen precipitator 32.

The pump 27 is of sufficient capacity to draw dust-laden air through the duct 18 to such an extent that a materially reduced volume of dust remains in the atmosphere about the machine. The pump 27 draws the dust-laden air along the duct 18 from both directions and also along and from the duct 23 and the means 20. As most of the dust is created by the cutting head, a considerable proportion of it is drawn in at the top of the means 20 through which the cuttings pass to the conveyor 9. Also, dust from the surrounding atmosphere is drawn in through the means 20. Dust from the surrounding atmosphere is likewise drawn in through the opening at 21, such opening being disposed above the forward extremity of the conveyor 9 so that the conveyor may at such point receive small pieces of coal dropped by the cutting head or shoveled in through the opening 21 by hand. Thus the dust-laden air throughout the entire conveyor system and from the cutting head and from the surrounding air is drawn into the pump 27.

The pump 27 is equipped with a suitable precipitator which precipitates out the dust, such precipitated dust dropping into a container 33 at the bottom of the machine. The air from which the dust has been precipitated passes through the duct 31 and into the screen precipitator 32 where any last dust particles are precipitated out. The air emerging from the precipitator 32 is in most cases sufficiently free from dust to be harmless to the workmen. Within the precipitator 32 is a baffle 34 and a number of precipitating trays 35, one of which is shown in plan view in Figure 6. These trays may be removed and cleaned as necessary.

In Figures 7, 8, and 9 is shown a modified form of cutting head which comprises a hollow frame 36 about which is driven a cutter chain 37 carrying cutters 38.

The frame 36 is provided with openings 39 and a duct 40 communicates with the interior of the frame, the lower or discharge end of the duct communicating with the duct 9 shown in Figures 1 to 4, inclusive. Thus the dust-laden air and the dust created by the cutting head are drawn in through the openings 39 and through the interior of the hollow head and the duct 40 into the duct 9. When the cutting head shown in Figures 7, 8, and 9 is used in conjunction with a duct system as shown in Figures 1 to 4, inclusive, exceptionally efficient results in dust removal are accomplished.

My apparatus above described provides the first practical means of mining certain seams of coal which lie adjacent silicious formations without taking a chance of impairing the health of the miners. The control and withdrawal of the dust-laden air also promotes the efficiency of the miners by making working conditions more pleasant and livable, the machinery lasts longer due to comparative freedom from dust particles, and the product is comparatively clean.

While I have shown and described certain present preferred embodiments of the invention, it is to be distinctly understood that the same is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. A coal mining machine comprising cutting means, a mechanical conveying device for receiving and conveying the cuttings from the cutting means, and means for confining and withdrawing

dust originally carried into the conveying device along with the cuttings.

2. A coal mining machine comprising cutting means, a mechanical conveying device for receiving and conveying the cuttings from the cutting means, means for confining and withdrawing dust originally carried into the conveying device along with the cuttings, and a connection with said last mentioned means for withdrawing dust from the atmosphere surrounding the machine.

3. A coal mining machine comprising cutting means, a substantially enclosed mechanical conveying device for receiving the cuttings from the cutting means, and means for withdrawing dust from the cuttings along said conveying device.

4. A coal mining machine comprising cutting means, a mechanical conveying device, an entrance for cuttings from said cutting means into said conveying device, and means for confining and withdrawing from said conveying device dust carried into the conveying device along with the cuttings, said last mentioned means also withdrawing dust from the atmosphere surrounding the machine.

5. A coal mining machine comprising swingable cutting means, a predeterminedly positioned mechanical conveying device for receiving cuttings from the cutting means in any position thereof, means substantially enclosing the conveying device, auxiliary enclosing means communicating with said first mentioned enclosing means and with the cutting means and through which the cuttings pass upon being delivered from the cutting means to the conveying device, and means for withdrawing dust within both said enclosing means.

6. A coal mining machine comprising vertically adjustable horizontally operable cutting means, a conveying device for receiving cuttings from the cutting means, means substantially enclosing the conveying device, auxiliary enclosing means communicating with said first mentioned enclosing means and with the cutting means and through which the cuttings pass upon being delivered from the cutting means to the conveying device, said auxiliary enclosing means being adjustable as to length depending upon the vertically adjusted position of the cutting means, and means for withdrawing dust within both said enclosing means.

7. A coal mining machine comprising cutting means, a mechanical conveying device for receiving cuttings from the cutting means, enclosing means substantially enclosing the conveying device and communicating with the cutting means, and means for withdrawing dust within the enclosing means, said last mentioned means and said enclosing means being so constructed and arranged as also to withdraw dust from the atmosphere surrounding the machine.

8. A coal mining machine comprising a hollow cutting head having cutting means mounted thereon, a conveying device for receiving cuttings from the cutting means, enclosing means substantially enclosing the conveying device and communicating with the interior of the cutting head, and means for withdrawing dust within the enclosing means.

9. A coal mining machine comprising a hollow cutting head having cutting means mounted thereon, a conveying device for receiving cuttings from the cutting means, enclosing means substantially enclosing the conveying device and communicating with the interior of the cutting head, and means for withdrawing dust within the enclosing means, the cutting head having passage means therethrough through which dust from the atmosphere surrounding the machine may be drawn.

10. A coal mining machine comprising cutting means, a mechanical conveying device for receiving cuttings from the cutting means and for delivering the same at a point remote from the cutting means, enclosing means substantially enclosing the conveying device, and means communicating with the enclosing means intermediate the ends of the conveying device for withdrawing dust therefrom.

11. A coal mining machine comprising cutting means, a mechanical conveying device for receiving and conveying the cuttings from the cutting means, means for confining and withdrawing dust originally carried into the conveying device along with the cuttings, and means for precipitating said dust.

JEROME C. WHITE.