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G. B. EUSTIS

2,084,296

CARBON BLACK SACK

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Fig. 1.

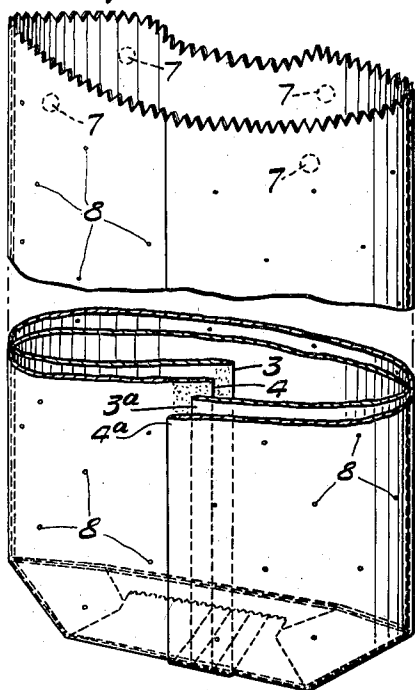


Fig. 4.

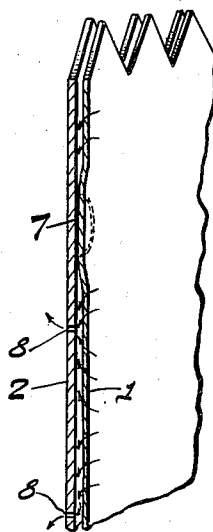


Fig. 2.

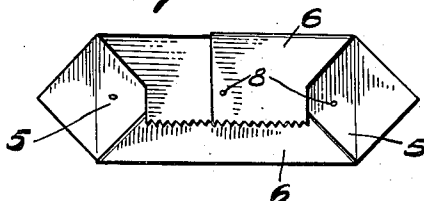


Fig. 3.

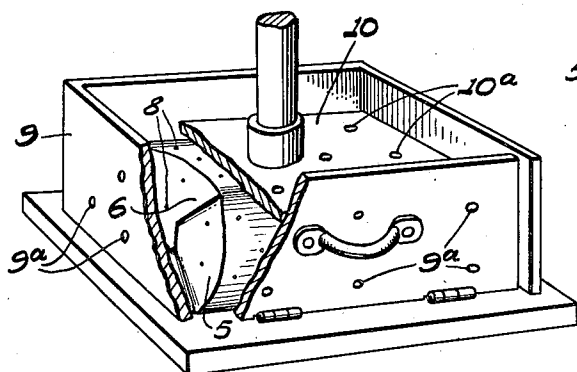
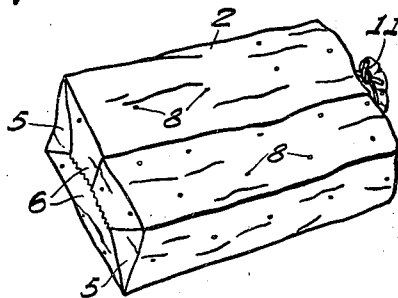


Fig. 5.



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UNITED STATES PATENT OFFICE

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CARBON BLACK SACK

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6 Claims. (Cl. 206—46)

The present invention relates to improvements in paper bags or sacks, and more especially to those of the kind used by the carbon black industry as a so-called packer sack for carbon black.

It has heretofore been the practice in the carbon black industry, in packing carbon black, to fill an open mouth sack with the carbon black by the use of the common screw or pressure packing method. However, carbon black, which consists of an impalpable powder of carbon mixed with or suspended in a large proportion of air remains in a fluffy condition in the sack, notwithstanding such pressure packing, and it has therefore been necessary to reduce the volume of the body of carbon black in the sack in order to render the material more dense and reduce the size of the package sufficiently for economical shipment. Such densification of the carbon black in the sack has usually been obtained by compression of the sack filled with the carbon black and tied, and after the filled and tied bag has been allowed to rest for a period of 48 hours to permit cooling of the entrained air, in a hydraulic or mechanical press. According to such previous practice forcing of the entrained air outwardly through the natural pores of the paper composing the walls of the sack has been depended upon for the expulsion of the air from the sack under such compression, and consequently papers used for the manufacture of such sacks have been of a so-called high porosity, that is, sheets of paper of sufficient thinness and of a texture which is sufficiently open to permit rapid passage of the air from the interior of the sack under the compression otherwise the sack would burst when compressed with resulting loss of carbon black and spoiling of the package, or the air would be confined and compressed within the sack and would expand when the compression was released, thereby puffing the package and rendering it difficult or impossible to slide the package into the usual overslip bag. The use of such high porosity or open texture papers for such sacks, however, has resulted in a weakened package, since such papers have not been calendered or hardened to the standards required for a first grade sheet of paper, and hence they are low in Mullen test, tear and tensile strength, and the sacks heretofore made from such papers have been subject to frequent bursting in the press during compression or during handling of the package.

The primary object of the present invention is to provide a novel and improved carbon black sack which is capable of rapidly expelling air from

the carbon black therein under compression and yet will possess much greater strength to resist bursting than sacks of this kind as heretofore known or used.

More particularly, the present invention enables carbon black sacks to be manufactured inexpensively which employ paper of high grade or so-called super high grade, possessing great strength to resist bursting, strains or other stresses, and thus reduce materially the breakage heretofore taking place during the packing operation, and which paper, although of low porosity, is provided with artificial pores through which the air may be expelled from the sack when the carbon black therein is compressed.

In the preferred embodiment of the invention, the sack is of the duplex type comprising an inner bag or sack composed of paper of high porosity and an outer bag or sack of high grade paper of low porosity but of high strength and which is provided with artificial pores, the inner bag serving, when the sack filled with the carbon black is compressed, as a filter through which the air or other gases may escape while the fine particles of carbon black are retained, and the outer bag permitting the air or gases expelled through the porous inner bag to escape through the artificial pores therein while affording sufficient strength to prevent bursting or breakage of the inner bag during compression in the press or during subsequent handling of the package.

To these and other ends, the invention consists in certain improvements and combinations and arrangements of parts all as will be hereinafter more fully described, the features of novelty being pointed out more particularly in the claims at the end of this specification.

In the accompanying drawing:

Figure 1 is a perspective view, partly broken away, of a carbon black sack embodying the present invention;

Figure 2 is a bottom plan view of the sack;

Figure 3 is a diagrammatic view illustrating the manner in which the sack filled with carbon black and closed, is compressed;

Figure 4 is a detail sectional view, on an enlarged scale, showing the inner and outer walls of the sack and illustrating diagrammatically the manner in which air or gases are expelled from the sack through the walls thereof; and

Figure 5 is a perspective view of the compressed and finished package.

Similar parts are designated by the same reference characters in the different figures.

The carbon black sack provided by the present invention comprises an inner bag 1 and an outer bag 2 which form the inner and outer walls of the sack. The inner wall 1 according to the present invention is composed of a sheet of paper of high porosity to air or gases, it being of open texture and slightly sized and unhardened, and this paper is preferably relatively thin, it being composed for example of 35 lb. kraft paper and the outer bag 2 is composed of paper of relatively low porosity and of the so-called super-grade of calendered and hardened paper of maximum qualities according to Mullen, tear and tensile tests, and this outer wall is preferably of greater thickness than that of the inner wall, it being composed for example of 40 lb. super-kraft paper. The sack composed of the inner and outer bags may be manufactured economically on an ordinary bag machine from tubes which may be formed either separately or collectively, according to the customary practice in making bags of two or more walls, as for example by feeding superposed webs of paper to form the two bags to the usual former and folding the webs around the former into tubes so that the inner tube is inclosed within the outer tube, the longitudinal edges 3, 3^a and 4, 4^a of the inner and outer tubes, which are previously supplied with adhesive, being overlapped and united, as shown for example in Figure 1, to form the longitudinal seam of the bag, the bag tube being severed into bag sections of suitable length in the usual manner. The mouth of the bag is left open but the bottom thereof is closed in any suitable manner, as by folding the narrow sides of the bag inwardly to form closing flaps 5 and folding the flat or wider sides of the bag inwardly to form flaps 6 which are pasted one upon the other, the bag bottom shown in the present instance being of the well-known satchel bottom type. The walls of the inner and outer bags thus formed and composing the sack are preferably united to one another near or adjacent to the mouth of the bag as by spots of adhesive 7, in order to prevent separation of the mouths of the inner and outer bags during filling.

The inner bag 1 composed of open texture paper or paper of high porosity will permit air or gases to pass readily therethrough substantially throughout the area of this inner bag, but the outer bag which is composed of a paper of low porosity, according to the present invention, is artificially rendered porous by providing it with a suitable number and arrangement of perforations 8, which are preferably in the form of pin point perforations which are distributed throughout the area of this outer wall at even or uneven intervals, these perforations communicating with the space between the inner and outer walls 1 and 2, these perforations being sufficiently numerous and in sufficiently close relation to enable them to discharge to the exterior of the sack such air or gases as may be expelled from the interior of the bag through the inner porous wall 1.

In packing carbon black in the improved sack provided by the present invention, the carbon black is introduced into the open mouth of the bag in any suitable manner as by the use of the common screw or pressure packing, and after the bag has been filled, its mouth is closed, as by gathering and tying it securely with a string 11, and the filled bag is then placed in a hydraulic, mechanical or other press, which may comprise a press box and plunger 9 and 10 hav-

ing means for forcing them relatively toward one another, the walls of the press box and the plunger, if desired, having bleed holes 9^a and 10^a for the escape of air and gases expelled from the bag when compressed.

The carbon black when introduced into the bag remains in a fluffy condition, notwithstanding the pressure packing employed in filling the bag, due to the large percentage of air or gases mixed with or entrained in the body of carbon black which is composed of very minute particles, and the bag containing the carbon black is subjected to compression in order to reduce the volume or size of the package and thus enable the packages to be shipped or stored in relatively smaller space and economically. The compression applied to the filled sack squeezes the body of carbon black contained therein, and the pressure thus applied to the air or gases within the sack causes such air or gases to be expelled through the natural pores in the porous inner bag or wall 1, this inner wall however serving as a filter to retain the carbon particles within it. The air or gases expelled through the inner porous wall or bag pass into the space between the inner and outer bags or walls, and, traveling along in this space, reach the artificial or pin point perforations 8 in the outer relatively non-porous bag or wall 2, such air or gases being thus discharged exteriorly of the sack. The squeezing of the entrained air or gases from the body of carbon black in the sack increases the density of the carbon black and reduces its volume, and the package of reduced size thus obtained furnishes a unit capable of economical handling, storage and shipment. Such reduction in size of the sack and its contents also enables the same to be readily inserted into the outer or overslip bag usually employed, and which serves purely as a wrapper for the compressed package.

By making the sack of an inner bag or wall of paper of high porosity, and the outer bag or wall of a hard dense paper of substantially greater strength than the inner bag but which is artificially rendered porous by pin point or similar perforations, the inner bag or wall will function effectively as a filter, during compression of the filled sack, to permit expulsion of air or gases from the body of carbon black therein but prevent escape of the carbon black, and the outer bag or wall will serve as a strong reinforcement for the inner bag or wall which is of relatively low Mullen test, tear and tensile strength, the outer bag or wall thus affording sufficient strength for the inner bag or wall to prevent tearing or bursting thereof under the stresses imposed in the press during compression and also providing a relatively strong enclosure for the inner bag which will effectively resist or prevent tearing or bursting of the sack during subsequent handling. While the perforations in the outer bag or wall render the substantially non-porous paper composing it porous, these perforations are relatively small or minute, and yet they permit the passage of much more air than can flow through normal paper pores, so that there will be no bulging of the inner and outer walls of the sack by the trapping of air between them, and moreover the inner and outer walls of the sack will remain in close relationship during compression of the sack in the press, thereby reducing materially breakage of the sacks during the compressing operation. It will be understood that, if desired, more than one outer bag or wall of hard, strong paper and

artificially rendered porous by the pin point or other relatively minute perforations may be used if desired, although a single outer wall of hard dense paper capable of withstanding high Mullen, tear and tensile tests and artificially rendered porous by the pin point or relatively minute perforations, will be sufficient.

The improved carbon black sack made as hereinbefore described enables the outer artificially perforated bag to be made of a strong, hard and tough paper which will afford ample strength to the sack and yet permit the escape of air or gases therethrough, and the inner porous bag may be made of relatively thin soft and highly porous paper so that it may filter the carbon black and permit free escape of the air or gases throughout its area. In other words, the inner highly porous bag may function essentially as a filter, although affording relatively small strength to the sack, and the outer bag composed of the hard, tough and strong paper but rendered porous by the artificial perforations will afford the requisite strength for the sack.

The sheet of paper composing the outer wall of the sack may be artificially perforated in different ways as by a pin-perforating roll carrying pins or points which force themselves through the paper web as the latter is fed in the bag machine or its connected equipment or as the paper web passes through the paper machine or during re-winding of the paper, or by a comb or other appliance having sharp points to act as a punch on the paper web prior to or during the passage thereof into the bag machine.

I claim as my invention:

1. A carbon black sack comprising an inner bag composed of a highly porous paper of rela-

tively low strength, and an outer enclosing bag composed of low porosity paper of greater strength having artificial pores therein.

2. A carbon black sack comprising an inner bag composed of open porous paper forming a filter, and an outer bag of greater strength but relatively low porosity provided with artificial pin point perforations distributed at intervals throughout its area.

3. A carbon black sack comprising an inner bag composed of highly porous material of relatively low strength and forming a filter, and an enclosing outer bag composed of foraminous material of relatively lower porosity but greater strength than the inner bag.

4. A carbon black sack comprising an inner bag composed of relatively thin naturally porous paper forming a filter for carbon black introduced therein, and an outer enclosing bag composed of a relatively thicker paper of less porosity, but provided with artificial pores throughout the area of the sack.

5. A carbon black sack comprising an inner bag composed of uncalendered open texture porous paper, and an outer bag composed of calendered hard paper of low porosity provided with artificial pores distributed throughout the area of the sack.

6. A carbon black package comprising an inner bag composed of porous material and confining a body of carbon black therein, and an enclosing reinforcing bag composed of material of relatively lower porosity and relatively greater strength and having artificial pores therein distributed throughout its area.

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