HIGH TEMPERATURE CARBON BLACK AIR PREHEATER

BACKGROUND

TECHNICAL FIELD

[0001] The present disclosure relates to high temperature air preheater technology that can be useful in the manufacture, handling, and/or post-treatment of carbon black and other particular carbonaceous materials.

TECHNICAL BACKGROUND

[0002] Carbon black manufacturing processes can involve high temperatures and environments that can result in the degradation of may common industrial materials. Thus, there is a need for improved materials for use in carbon black manufacturing, handling, and post-treatment processes. These needs and other needs are satisfied by the compositions and methods of the present disclosure.

SUMMARY

[0002a] In one aspect, provided herein is a carbon black air preheater, wherein at least a portion of the carbon black air preheater comprises an alloy comprising from about 3 wt.% to about 10 wt.% aluminum, from about 18 wt.% to about 28 wt.% chromium, from about 0 wt.% to about 0.1 wt.% carbon, from about 0 wt.% to about 3 wt.% silicon, from about 0 wt.% to about 0.4 wt.% manganese, from about 0 wt.% to about 0.5 wt.% molybdenum, and a remaining balance of iron.

[0003] In accordance with the purpose(s) of the ~~invention~~disclosure, as embodied and broadly described herein, this disclosure, in one ~~aspect~~example, relates to high temperature materials and air preheaters comprising the same, suitable for use in, for example, carbon black manufacturing, handling, and/or post-processing; together with articles and methods of manufacturing and using the above.

[0004] In one ~~aspect~~example, the present disclosure provides a carbon black air preheater, wherein at least a portion of the carbon black air preheater comprises an alloy comprising from about 3 wt.% to about 10 wt.% aluminum, from about 18 wt.% to about 28 wt.% chromium, from about 0 wt.% to about 0.1 wt.% carbon, from about 0 wt.% to about 3 wt.% silicon, from about 0 wt.% to about 0.4 wt.% manganese, from about 0 wt.% to about 0.5 wt.% molybdenum, from

about 0 wt.% to about 37 wt.% nickel, from about 0 wt.% to about 29 wt.% cobalt, and a remaining balance of iron.

[0005] In another ~~aspect~~example, the present disclosure provides a carbon black air preheater comprising an alloy that forms a surface passivating layer on at least a portion of the alloy upon sustained exposure to a carbon black manufacturing environment.

[0006] In another ~~aspect~~example, the present disclosure provides a carbon black air preheater wherein all or a portion of a plurality of tubes disposed within the carbon black air preheater comprise an alloy, as described herein.

[0007] In another ~~aspect~~example, the present disclosure provides a carbon black air preheater capable of heating air to a temperature of at least about 1,000 °C for a sustained period of time.

[0008] In yet another aspect, the present disclosure provides a carbon black manufacturing process comprising a carbon black furnace and a carbon black air preheater positioned downstream of and in fluid communication with the carbon black furnace, wherein the carbon black air preheater comprises an alloy comprising from about 3 wt.% to about 10 wt.% aluminum, from about 18 wt.% to about 28 wt.% chromium, from about 0 wt.% to about 0.1 wt.% carbon, from about 0 wt.% to about 3 wt.% silicon, from about 0 wt.% to about 0.4 wt.% manganese, from about 0 wt.% to about 0.5 wt.% molybdenum, and a remaining balance of iron.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The accompanying figures, which are incorporated in and constitute a part of this specification, illustrate several aspects and together with the description serve to explain the principles of the invention.

[0010] FIG. 1 is a schematic illustration of a conventional carbon black manufacturing process.

[0011] FIG. 2 is a cross-sectional illustration of a carbon black air preheater, in accordance with various aspects of the present disclosure.

[0012] FIG. 3 is an expended cross-sectional illustration of a carbon black air preheater, in accordance with various aspects of the present disclosure.

[0013] Additional aspects of the invention will be set forth in part in the description which follows, and in part will be obvious from the description, or can be learned by practice of the invention. The advantages of the invention will be realized and attained by means of the elements and combinations particularly pointed out in the appended claims. It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the invention, as claimed.