

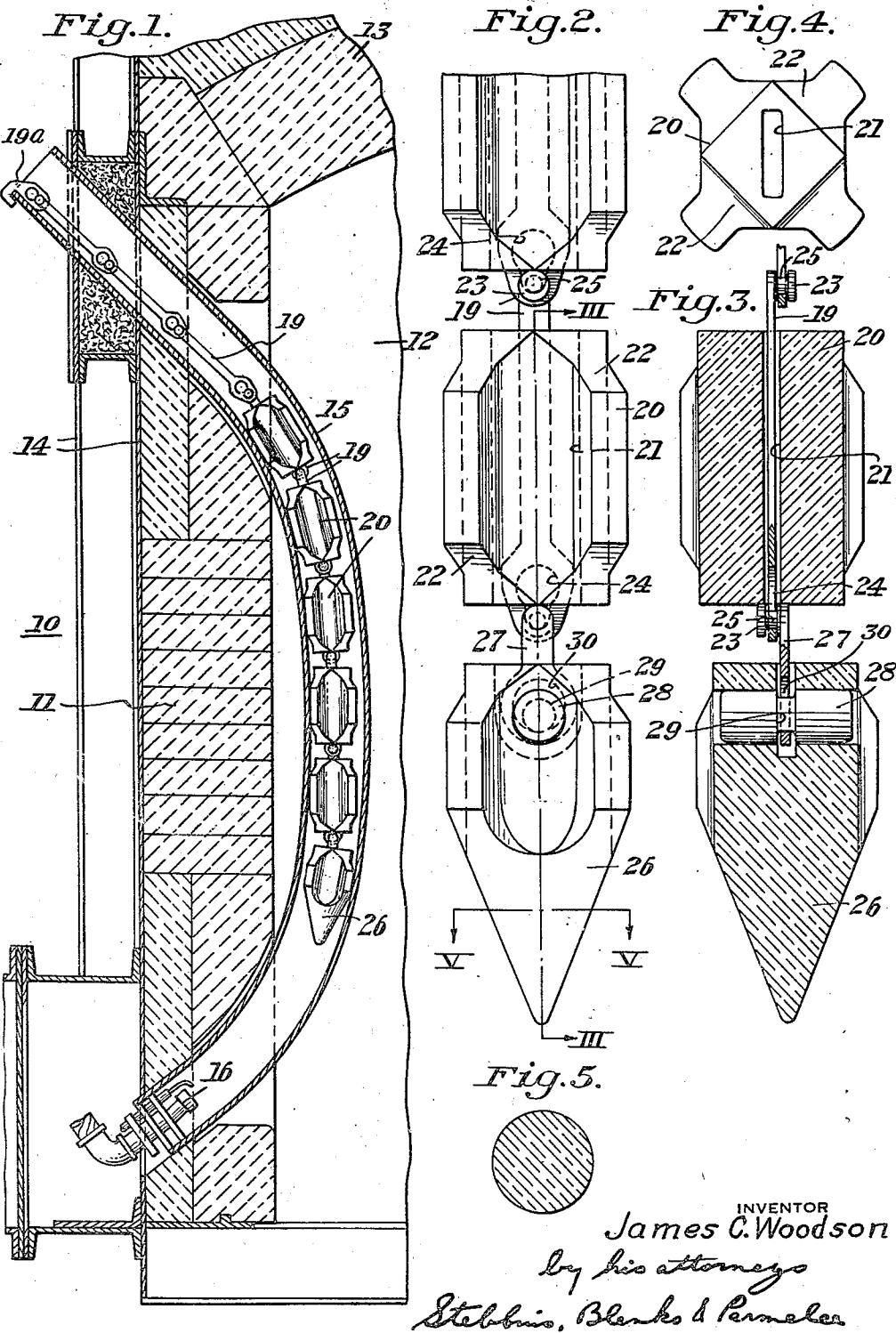
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BAFFLE FOR HEAT EXCHANGE TUBES

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BAFFLE FOR HEAT EXCHANGE TUBES

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This invention relates to a baffle for heat-exchange tubes such as those employed in annealing furnaces of the cover type, such as that described and claimed in Wilson Patent No. 1,952,402.

Baffles disposed in heat-exchange tubes such as those of the aforementioned patent have several functions, viz., to restrict the combustion generally to the lower portion of the tube where it is desired that most of the heat be absorbed and radiated to the work; to break up the central "core" of hot combustion gases which would be formed in the absence of baffles; and to cause such gases to scrub the inner surfaces of the tubes more thoroughly whereby to cause the absorption by the tubes of the maximum amount of heat from the gases. The severity of the operating conditions within the heat-exchange tubes and the particular conformation of the tubes themselves make proper baffling of the hot combustion gases a serious problem. The results of earlier efforts along this line are disclosed in copending applications Serial Nos. 49,078 and 74,958 and, with the experience gained in the use of the baffles there shown, I have invented a novel form of baffle which affords a highly satisfactory solution to a somewhat perplexing problem.

In accordance with my invention, I utilize a plurality of refractory blocks as baffles. The blocks are assembled in the form of a chain on metallic links which may be readily attached to and separated from each other. The blocks are shaped to direct the combustion gases toward the inner surface of the heat-exchange tubes, without objectionably interfering with the flow of gases longitudinally of the tube. The metallic links extending axially of the blocks are protected to a large extent from the combustion gases whereby rapid deterioration thereof, because of the high temperature of the gases, is avoided.

The accompanying drawing illustrates a preferred embodiment of the invention and is to be read in connection with the following detailed description. In the drawing,

Fig. 1 is a partial transverse section through the side wall of a cover-type furnace and a heat-exchange tube mounted therein;

Fig. 2 is a partial elevation of a baffle;

Fig. 3 is a sectional view along the line III—III of Fig. 2;

Fig. 4 is a plan view of one of the baffle blocks; and

Fig. 5 is a section along the line V—V of Fig. 2.

As an example of the applications which may be made of the invention, I show a cover-type furnace 10 comprising side walls 11, end walls 12 and a roof 13 composed of refractory material assembled within a structural frame 14. The cover 10 is open at the bottom and is adapted to be disposed on a charge-receiving base (not shown).

Heat-exchange tubes 15 are mounted on the side walls of the cover 10. The construction and arrangement of these tubes are more particularly described and claimed in my copending application Serial No. 74,958 above referred to. A burner 16 is mounted in the lower end of each tube for delivering hot combustion gases thereto. A baffle 17 is suspended in each tube from the upper end thereof by means to be described later.

The baffle 17 comprises a plurality of metallic links 19 detachably connected and refractory blocks 20 disposed on certain of the links as shown in Fig. 1. The blocks are somewhat cruciform in shape, as shown in Fig. 4, and have a central slot 21 therethrough to admit the links 19. The ends of the blocks are somewhat tapered, as at 22, in a manner which can perhaps be best described by stating that the corners are "knocked off".

The links 19 each have a head 23 at one end and an eye 24 at the other end. The eye has a large portion and a reduced portion whereby the head may readily be inserted through the former and temporarily locked by movement of the neck 25 into the reduced portion of the eye.

At the bottom of the baffle, a special block 26 is suspended on a short link 27 by a refractory pin 28. The pin has a peripheral groove 29 adapted to receive the edge of the eye 30 in the link 27 to prevent movement of the pin from the block while the latter is suspended. The block 26 is tapered toward its lower end to divert the ascending stream of combustion gases substantially uniformly thereabout.

A hook link 19a is adapted to engage the upper edge of the tube 15. The topmost link 19 is secured to the link 19a by the same head and eye arrangement which connects the links 19 to each other.

The baffle 17 may conveniently be assembled apart from the tube 15 and then lowered thereinto. The shape of the blocks is such as to cause thorough scrubbing of the inner wall of the tube by the gases without offering excessive resistance to the flow thereof. The metallic links are protected from direct contact with the combustion gases to a large extent, and particularly the bot-

tom link 27 which does not extend through the block 26 but terminates short of the lower end thereof. The blocks 20 and 26 are preferably composed of porcelain as is also the pin 28. The links 19 and 27 are preferably cast from a heat-resistant alloy such as chrome-nickel steel.

The construction is such as to facilitate removal of any link or block for replacement should that become necessary, without disturbing the remaining links and blocks. As shown in Figs. 2 and 3, the blocks 20 rest on the head 23 of the link therebelow, and thus tend to prevent removal of the head from the eye of the link through which it is inserted. The baffle shown being of the nature of a chain, it is flexible in all directions and no particular pains need be taken when inserting it in a tube. A baffle of the type shown is particularly effective in confining combustion largely to the lower portion of the tube 15, as well as in breaking up the central "core" of combustion gases which would be formed in the absence of a baffle, and thus insures intimate contact of all the combustion gases with the tube wall.

Although I have illustrated and described but one preferred embodiment of the invention, it will be apparent that changes in the exact construction disclosed may be made without varying the principle thereof.

I claim:

1. A baffle for heat-exchange tubes comprising a plurality of refractory blocks, an axial hole through each block, a metallic link positioned in the hole in each block, said links having a head at one end and an eye at the other adapted to receive the head of an adjacent link, whereby the links may be assembled in a chain with the blocks strung on the links in the manner of beads.

2. The baffle defined by claim 1 characterized by said blocks having their corners knocked off.

3. A chain baffle adapted to be suspended in a heat-exchange tube comprising a plurality of bar links, each having a head at one end and an eye at the other, the head of each link being inserted through the eye of the adjacent link, and a refractory block for each link, the block having an axial hole through which the link extends.

4. A chain baffle defined by claim 3 characterized by the block on each link resting on the head of the link below.

5. The chain baffle defined by claim 3 characterized by the bottom link of the chain having its block secured thereto by a refractory pin.

6. The chain baffle defined by claim 3 characterized by the bottom link extending into its block but terminating short of the lower end of the block.

7. A chain baffle adapted to be suspended in a heat-exchange tube comprising a plurality of refractory blocks, each block having an axial hole therethrough, and a link extending through said hole, the links of adjacent blocks being connectible to form a chain.

8. The chain baffle defined by claim 7 characterized by said links having means separably connecting them.

9. A baffle for heat-exchange tubes comprising a plurality of refractory baffle members, slots extending axially through said members, flat bar links having cooperating eyes and heads disposed in said slots and assembled together to form a chain.

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