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CUTTER

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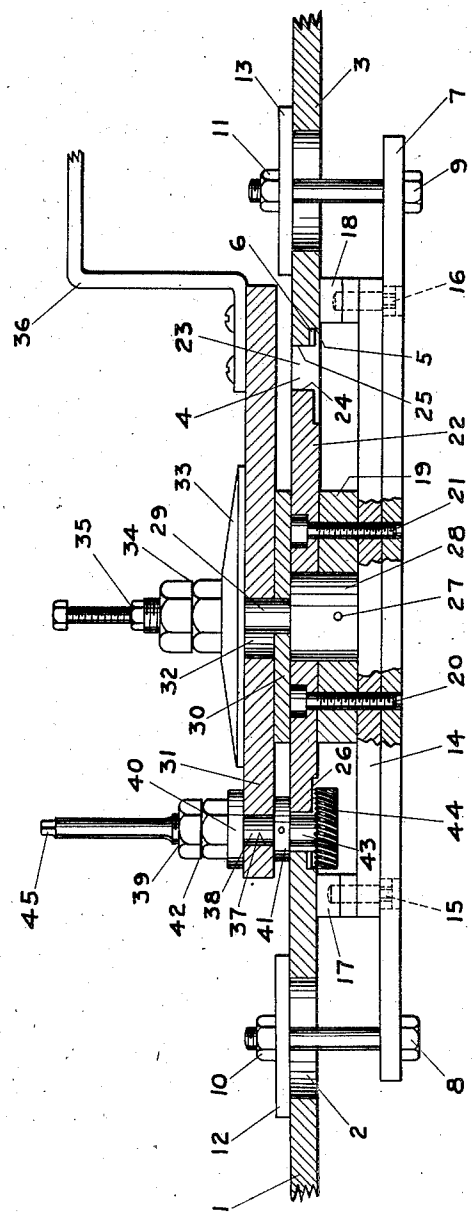


FIG 1

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CUTTER

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This invention relates to cutters and more particularly to cutters for the corroded edges of handhole openings in boiler headers containing super-heater tubes.

Such headers generally consist of a chamber having a wall provided with circular openings through which the super-heater tubes may be observed and, in addition, elliptical or oval openings having closure plates secured in a suitable manner, as by dogs, against the edges of the elliptical openings interiorly of the chamber. While a gasket is usually interposed between the closure plates and edges of the openings action of the steam in the header causes corrosion of the plate seats which results in leakage from the header. The plate seats at the elliptical opening edge thus must be periodically ground or refaced.

Because of the shape of the elliptical openings the refacing operation is made difficult, it being tedious and inefficient to normally hold a cutter against the irregularly shaped edges to be cut in the refacing operations.

Objects of the present invention, are, therefore, to provide for facilely, economically and efficiently refacing hand-hole plate seats of irregular shape in the interior of boiler headers; and to provide improved elements and arrangements thereof in a cutter and mounting therefor.

In accomplishing these and other objects of the present invention, I have provided improved details of structure the preferred form of which is illustrated in the accompanying drawing wherein:

Fig. 1 is a vertical cross-sectional view through a cutter embodying this invention showing its relation to a header and handhole therein edges of which are to be refaced.

Referring more in detail to the drawing:

1 designates the top wall of a boiler header comprising a chamber that contains superheater tubes. Headers of this character are normally provided with circular observation holes 2 and 3 and, in addition, elliptical, oval or other irregularly shaped openings 4 are provided in the header wall 1. The openings 4 constitute handholes by which access may be had to the tubes in the header for desired work on the tubes. The handholes 4 are normally provided with closures which constitute plates, the upper edges of which are arranged in seats 5 in the outer lower periphery of the header wall portions that bound the handholes.

Even though gaskets are normally inserted between the handhole closures and seats therefor,

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the seats corrode, as indicated at 6, the result of which is a leakage out of the handholes. The corroded portions of the handhole closure seats are difficult to treat because of their position and irregular shape, and, as indicated above, it is the purpose of this invention to overcome that difficulty.

7 designates a base member which may be of any suitable rigid material and is of preferably rectangular shape. The base member 7 is provided with stud bolts 8 and 9 at its ends extending upwardly through the circular openings 2 and 3 adjacent the elliptical handhole 4 the shanks of which bolts are secured, as by nuts 10 and 11, to the supporting blocks 12 and 13 that bridge the openings 2 and 3.

Mounted on the base member 7 is an accurately machined plate 14 that is secured to the base by counter-sunk screws 15 and 16, the inner ends of which engage and secure to the plate 14 the spacing blocks 17 and 18. The machined plate 14 generally conforms to the shape of the base member 7 and is of a length sufficient to bridge the handhole 4 in such a manner that the spacing blocks 17 and 18 may engage the inner surface of the header wall 1 at opposite ends of the handhole 4.

A cam base 19 is fixedly mounted on the machine plate 14, as by the screws 20 and 21, the heads of which are counter-sunk in the upper surface of a cam 22 superimposed upon the cam base 19.

The cam 22 is of a shape conforming to the periphery of the handhole 4 but of less surface area than the area of the handhole to provide a passageway 23 between the cam face 24 and the inner face 25 of the wall portion defining the handhole 4. The lower face of the cam may be provided with an offset 26, if desired, for a purpose later described. The cam base 19 and cam 22 are fixedly mounted, as by a pin 27, on the enlarged end 28 of a spindle 29. A washer 30 is sleeved on the spindle 29 and rests on the upper surface of the cam 22.

31 designates a cross-head of suitable shape and size to bridge the handhole 4 provided with a central aperture 32 of greater diameter than the spindle 29 to allow play of the cross-head on the spindle. A washer 33 in cooperation with lock nuts 34 retains the cross-head 31 on the spindle. The spindle is adjusted relative to the header wall 1 by the adjusting screw 35.

The cross-head 31 is provided at one end with a handle 36 for manipulating the same and an aperture 37 at its other end for receiving the

shank 38 of a cutter assembly 39, the assembly being positioned in the aperture 37 by washers 40 and 41 that are suitably secured to the shank on opposite faces of the cross-head. The shank is adjustable vertically relative to the cross-head by turning the same and tightening the lock nuts 42 down on the washer 40.

The washers 40 and 41 on the cutter assembly shank are so arranged relative to the cross-head that a portion 43 of the shank is available to serve as a cam follower loosely and slidably engageable with the periphery of the cam 24 in relatively closely spaced relation to the bound edges of the handhole 4.

The cutter 44 proper is mounted on the lower end of the cutter shank and is preferably provided with teeth on its side and upper surface of such a character as to act on the corroded portion 6 of the handhole edges. The cutter does not act on the cam because it may follow in the offset 26 provided in the lower surface of the cam.

The upper end of the cutter assembly shank is provided with a fitting 45 of a character suitable for receiving a conventional driving mechanism of any desired type.

Operation

The operation of an apparatus constructed as described is as follows:

The cutter shank is adjusted vertically in the cross-head 31 to position the teeth on the upper face of the cutter proper in engagement with the corroded portion 6 of the handhole edges. A power drive is then applied to the cutter shank fitting 45 to actuate the cutter and reface, grind or otherwise work upon the corroded handhole plate seat 5. The handle 36 is then manipulated to rotate the cross-head 31 in such a manner that the shank portion 43 of the cutter assembly, follows the face 24 of the cam around the periphery of the cam. Because the cam is of the same shape as the handhole 4, mere rotation of the cross-head 31 effects refacing of the handhole plate seat.

It will be recognized that since the handhole 4 and cam 22 are, in this instance elliptical or oval in shape, they each have opposed axes of different lengths and the cutter must move from left to right, as shown in the drawing, to accurately follow the cam and seat during travel of the cutter around the cam. The size of the aperture 32 in the cross-head provides for such movement to allow retraction of the cutter when the cutter approaches the shorter axis or diameter of the handhole as well as protraction of the cutter adjacent the edges of the handhole plate seat adjacent its longer axis.

After the cutter has refaced the handhole plate seat 5, the dogs or blocks 12 and 13 supporting the base member 7 may be removed and the cutter assembly, including the mounting therefor, may be removed from the handhole 4 and reapplied to the header wall 1 in position to reface another handhole plate seat.

While I have shown but one embodiment of my invention, it is apparent that the device is susceptible to modification without departing from the spirit of the invention. I do not wish, therefore, to be limited by the disclosures set forth, but only by the scope of the appended claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. In a device of the character described, a base member engageable with a wall of a chamber having an opening edges of which are to be worked upon, a plate mounted on the base member and adjustably engageable with said wall to align said plate in relation to said wall, a cam mounted on said plate having a face corresponding to the shape of said opening and of less surface area to provide a passage between the cam and the edges of the opening, a spindle on the cam, means on the spindle for adjusting the cam relative to said opening, a cross-head having an opening of greater diameter than the spindle for rotatably mounting the cross-head on the spindle and allow play thereof on the spindle, said cross-head having a handle portion for rotating the same, a cutter rotatably mounted on the cross-head having cutting portions engageable with edges of said opening, a cam follower on the cutter to guide the cutter around the cam in engagement with said opening edges, and means for actuating said cutter.

2. In a device of the character described, a base member engageable with a wall of a chamber having an opening edges of which are to be worked upon, a plate mounted on the base member and adjustably engageable with said wall to align said plate in relation to said wall, a cam mounted on said plate having a face corresponding to the shape of said opening and of less surface area to provide a passage between the cam and the edges of the opening, a spindle on the cam, a cross-head having an opening of greater diameter than the spindle for rotatably mounting the cross-head on the spindle and provide play therefor on the spindle, a cutter rotatably mounted on the cross-head having cutting portions engageable with edges of said opening, a cam follower on the cutter to guide the cutter around the cam in engagement with said opening edges, and means for actuating said cutter.

3. In a device of the character described, a base member engageable with a wall of a chamber having an opening edges of which are to be worked upon, a cam mounted on said base member, having a face corresponding to the shape of said opening and of less surface area to provide a passage between the cam and the edges of the opening, a spindle on the cam, a cross-head having an opening of greater diameter than the spindle for rotatably mounting the cross-head on the spindle and provide play therefor on the spindle, a cutter rotatably mounted on the cross-head having cutting portions engageable with edges of said opening, a cam follower on the cutter to guide the cutter around the cam in engagement with said opening edges, and means for actuating said cutter.

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