

June 25, 1935.

J. STAEMPFLI

2,006,283

MACHINE FOR MAKING BOILER CLEANER NOZZLES

Filed July 19, 1934

2 Sheets-Sheet 1

Fig. 1.

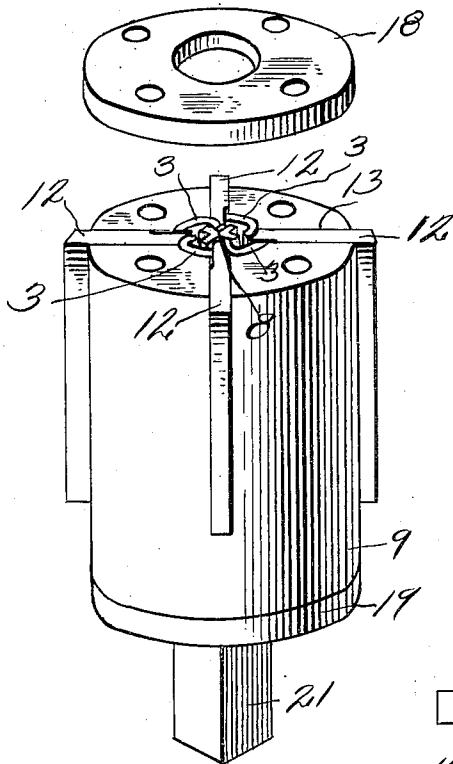


Fig. 2.

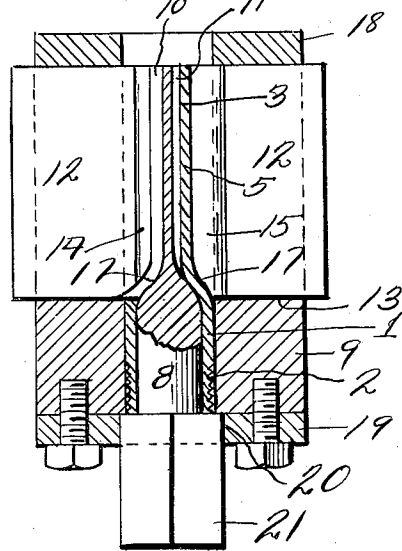


Fig. 3.

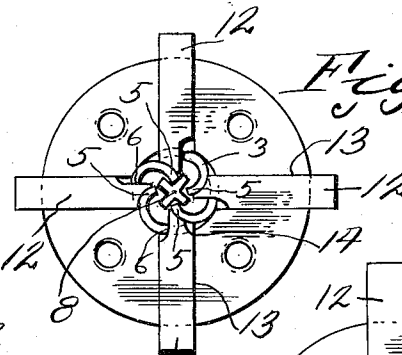


Fig. 4.

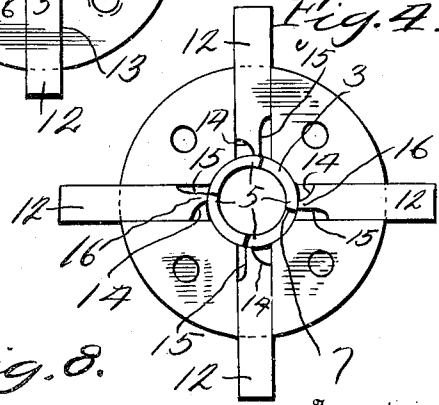


Fig. 5.

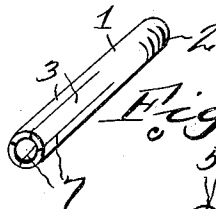
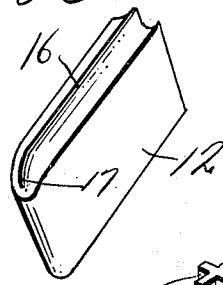


Fig. 6.

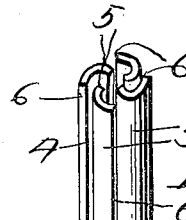


Fig. 8.

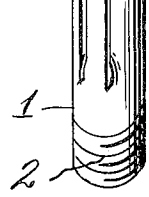
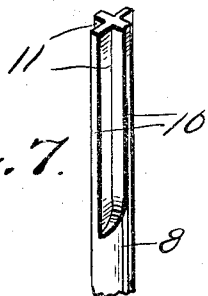


Fig. 7.



Inventor

Joseph Staempfli

Philip A. Sewell

Attorney

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J. STAEMPFLI

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Fig. 9.

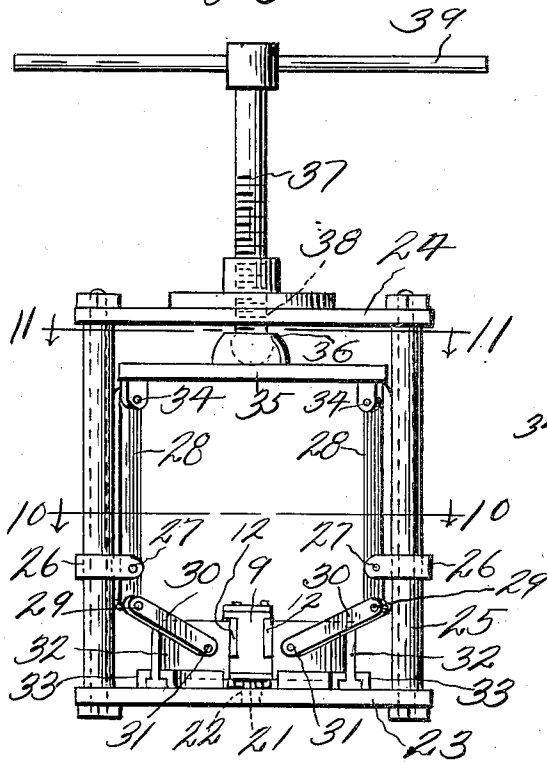


Fig. 11.

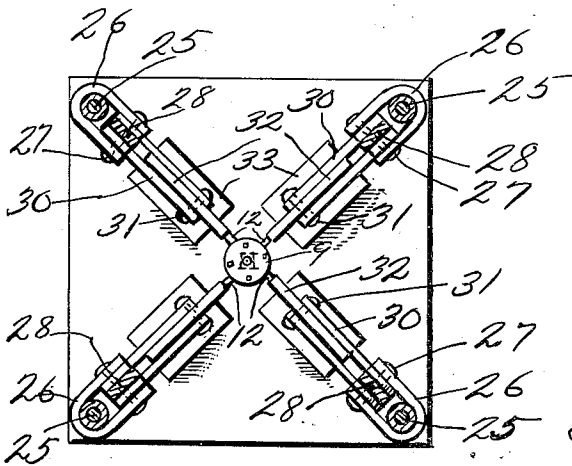
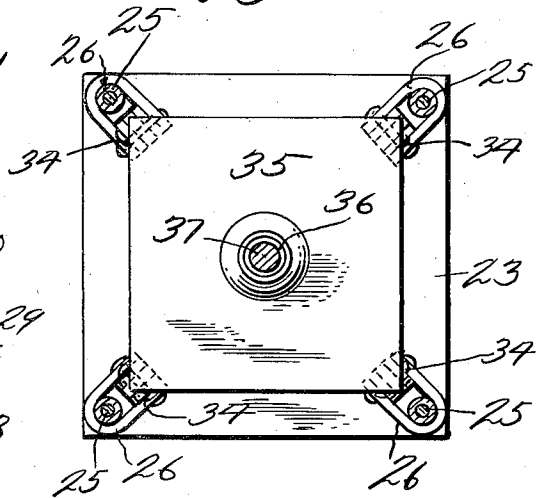


Fig. 10.

Inventor  
Joseph Staempfli

By Philip A. Serrell  
Attorney

# UNITED STATES PATENT OFFICE

2,006,283

## MACHINE FOR MAKING BOILER CLEANER NOZZLES

Joseph Staempfli, New Orleans, La.

Application July 19, 1934, Serial No. 736,074

7 Claims. (Cl. 153—48)

The invention relates to boiler cleaner nozzle making machines, and has for its object to provide a machine wherein boiler cleaner nozzles may be formed with vanes arcuate shaped in horizontal cross section and with their adjacent edges in spaced relation thereby forming slots through which liquid may pass.

A further object is to provide a tool for forming the nozzle, said tool comprising a body member having a plurality of radially movable bending plates mounted therein with their inner edges registering with alternate edges of the segmental edges of the nozzle and forming means whereby when said plates are forced inwardly, alternate edges of the segmental members of the nozzle will be bent inwardly towards the axis of the nozzle for forming vertical elongated slots in the nozzle.

A further object is to provide an axially disposed member within the nozzle during the bending of the nozzle vanes and having channels therein, thereby forming flanges for limiting the inward bending of the vane edges.

With the above and other objects in view the invention resides in the combination and arrangement of parts as hereinafter set forth, shown in the drawings, described and claimed, it being understood that changes in the precise embodiment of the invention may be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings:

Figure 1 is a perspective view of the nozzle forming tool, showing the top plate removed therefrom to better illustrate the invention.

Figure 2 is a vertical transverse sectional view through the tool and nozzle therein.

Figure 3 is a top plan view of the tool with the top plate removed.

Figure 4 is a view similar to Figure 3 but showing the nozzle vanes before the bending operation.

Figure 5 is a perspective view of one of the bending plates showing the bending rib thereof.

Figure 6 is a perspective view of the split nozzle before the bending operation.

Figure 7 is a perspective view of a portion of the member for limiting the bending operation of the vanes.

Figure 8 is a perspective view of a finished nozzle.

Figure 9 is a view in elevation of the machine for forcing the bending plate inwardly simultaneously.

Figure 10 is a horizontal sectional view taken on line 10—10 of Figure 9.

Figure 11 is a horizontal sectional view taken on line 11—11 of Figure 9.

The boiler cleaner nozzle is of the general type used in connection with boiler cleaners, for in-

stance as shown in Patent #1,888,515, issued November 22, 1932 to John H. Stockholder, however it varies in detail of construction, as hereinafter set forth.

The nozzle 1 is formed from a tubular member, for instance a pipe section and is provided with thread 2 at one end thereof, and with a plurality of curved vanes 3 for forming a plurality of vertical slots 4 through which surface debris and sub-surface debris is forced by pressure within the boiler as set up in said Stockholder patent above referred to. The nozzle vanes 3 have their alternate edges 5 bent inwardly as clearly shown in Figure 3, leaving the edges 6 in their normal position, circumferentially with the nozzle 1. In other words the edges 6 are within the outer periphery of the nozzle, thereby obviating a twisting operation where the opposite edges of a vane extend beyond the outer periphery of the nozzle and the inner periphery of the nozzle as in the Stockholder patent referred to. In this particular structure the vane is not weakened at its inner end as in a twisting operation, and at the same time the vane is arcuate shaped in transverse cross section throughout its entire length, thereby making the same extremely rigid so that the vanes will not bend and flex incident to pressure passing through the nozzle during a cleaning operation. In making the nozzles they are first provided with slots clearly shown in Figure 6 and designated by the numeral 7. The nozzle so slotted is then placed on the mandrel 8 and is then inserted in the body 9 of the nozzle forming tool, which may be supported in any suitable manner.

The mandrel 8 is provided with a plurality of flanges 10 forming recesses 11 into which the alternate edges 5 of the vanes 3 are bent and are limited in their inward movement, for insuring the forming of the curved slots 4 as clearly shown in Figure 3 by limiting the inward bending movement of the vane edges 5. After the mandrel with the nipple 1 thereon is placed in the tool body 9 as above described the bending plates 12, which are radially movable in slots 13 of the body are forced inwardly from the position shown in Figure 4 to the position shown in Figure 3 for the bending operation. The inner edges of the bending plates 12 are provided with curved channels 14 on one side thereof and channels 15 on the opposite sides which forms a flange 16 adjacent the nipple slots 7. It will be noted by referring to Figure 3, that when the bending plates 12 are forced inwardly, alternate edges of the vanes 3 will be bent inwardly and the mandrel 8 will limit the inward bending of the alternate edges 5, therefore it will be seen that a nipple is formed which will have the configuration shown in Figure 8 and above set forth. By providing the relatively narrow flanges 16 on the plates and the curved

channels 14, it will be seen that the starting of the bending operation will be at the extreme edge of vane, and the recesses 14 will allow the main edge 5, which is bent, to curve thereby insuring a transverse curve throughout the entire width and length of the vane. The lower ends of the vane terminate in curved portions 17 which curve downwardly and outwardly. By providing the curved portions 17, it will be seen by referring to Figure 2, vane edges 5, at their lower ends will curve downwardly and outwardly to the body of the nozzle.

From the above it will be seen that a boiler cleaner nozzle is provided which is simple in construction and rigid, and that a tool is provided for forming said nozzle which will allow the nozzle to be formed from pipe sections. It will also be seen that the plates 12 may be forced inwardly in any suitable manner, for instance in a vise or other machine.

The tool body 9 is provided on its upper end with a removable plate 18 for retaining the bending plates 12 in the slots 13, and to its lower end with a removable plate 19, having a square aperture 20 therethrough which receives the angular head 21 of the mandrel 8 for preventing rotation of the mandrel within the tool during the bending operation, hence it will be seen that the flanges 10 of the mandrel will positively limit the inward bending movement of the nozzle vanes.

Referring to Figures 9 to 11 inclusive, it will be seen that a machine is provided in which the nozzle forming member 9 may be placed for imparting simultaneous inward movement to the vane forming plates 12. The nozzle forming member 9 is placed in the forming machine with its rectangular shaped head 21 in the rectangular shaped aperture 22 in the bottom plate 23 of the machine, as clearly shown in Figure 9. The plate operating machine comprises the bottom plate 23 and the top plate 24, which are preferably rectangular shaped and connected together by corner posts 25 on which are slidably mounted U-shaped yokes 26, the arms of which are pivotally connected at 27 to the vertical links 29. The lower ends of the links 28 are pivotally connected at 29 to inwardly and downwardly extending links 30, the inner ends of which are pivotally connected at 31 to the inwardly and outwardly slidable members 32.

The slidable members 32 move radially in relation to the nipple holder 9 and are guidable in the guides 33 carried by the bottom plate 23 so that when they are simultaneously forced inwardly they will engage the bending plates 12 and simultaneously force the same inwardly for bending the blades during a single operation. The links 28 extend upwardly and are pivotally connected at 34 to the corners of the vertically movable plate 35 which has a ball and socket connection 36 to the operating screw 37, which is threaded at 38 through the upper plate 24 and is provided with a handle member 39 adapted to be grasped by the operator for rotating the screw and forcing the members 32 inwardly towards the nozzle holder 9 for the vane bending operation. It will be noted that the plate actuating members 32 may be moved inwardly and outwardly according to the direction of rotation of the operating screw 37.

The invention having been set forth what is claimed as new and useful is:

1. A tool for forming nozzles having vanes on a

tubular member with alternate edges of the vanes bent inwardly towards the axis of the nozzle and with the other alternate edges of said vanes in concentric relation with the nozzle, said tool comprising a body member, a channeled mandrel within the body member and adapted to receive the nozzle and bending plates slidably mounted in the body member and positioned whereby when forced inwardly the alternate edges of the nozzle vanes will be engaged thereby and be forced inwardly towards the channels of the mandrel.

2. A boiler cleaning nozzle forming tool comprising a body member, a channeled mandrel in the body member and adapted to receive a tubular split nozzle with its vanes in concentric relation and slidable plates in the body member and positioned to register with alternate edges of the nozzle vanes and bend the same inwardly towards and into the mandrel channels.

3. A device as set forth in claim 2 including narrow vane engaging edges carried by the plates, and concave surfaces on the vane bending edge sides of the plates.

4. A boiler cleaner nozzle forming tool comprising a body member, means for supporting a round tubular split nozzle in said body member and means carried by the body member and cooperating with alternate edges of vanes formed by the splits of the nozzle for bending in said alternate edges thereby forming vertically disposed splits or water passages of substantially uniform widths.

5. A nozzle bending machine comprising a frame having upper and lower plates, a nozzle holding body member, guide posts carried by said plates, means for supporting the nozzle holding body member on the lower plate, said nozzle holding body having radially movable vane bending plates outwardly disposed, radially movable and guided members carried by the lower plate in the path of the bending plates of the nozzle holder, vertically guided link bars on the guide post, inwardly and downwardly inclined link connections between the link bars and the radially movable and guidable members on the lower plate, an operating screw threaded through the upper plate, a head plate connected to the upper end of the vertically guided link bars, said operating screw being connected to said upper plate.

6. A nozzle bending machine comprising a channeled mandrel adapted to receive a split tubular nozzle, a body member surrounding said nozzle and vane bending blades inwardly movable in the body member in the plane of alternate vane edges and channels in the mandrel.

7. A nozzle bending machine comprising a frame, guide posts carried by said frame, a nozzle holding member, means for supporting the nozzle holding member in the frame, said nozzle holding member having radially movable vane bending plates outwardly disposed, radially movable and guided members carried by the frame in the path of the vane bending plates, slidable members on the guide post, means for moving said slidable members upwardly or downwardly and connections between the slidable members on the guide post and the radially movable and guided members carried by the frame whereby said last named members may be forced inwardly or outwardly for a nozzle bending operation.

JOSEPH STAEMPFLI.