March 10, 1942. R. F. CLEARY 2,275,889

GRINDING TOOL

Original Filed April 20, 1939

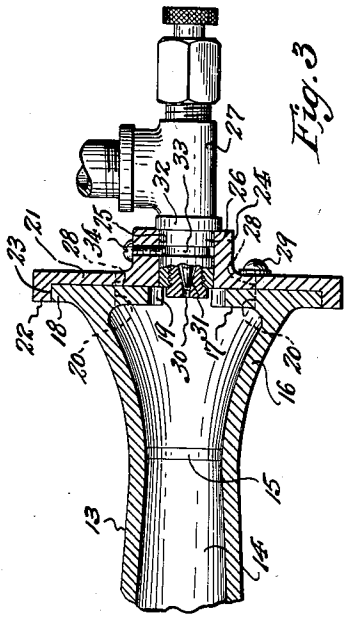

Fig. 3

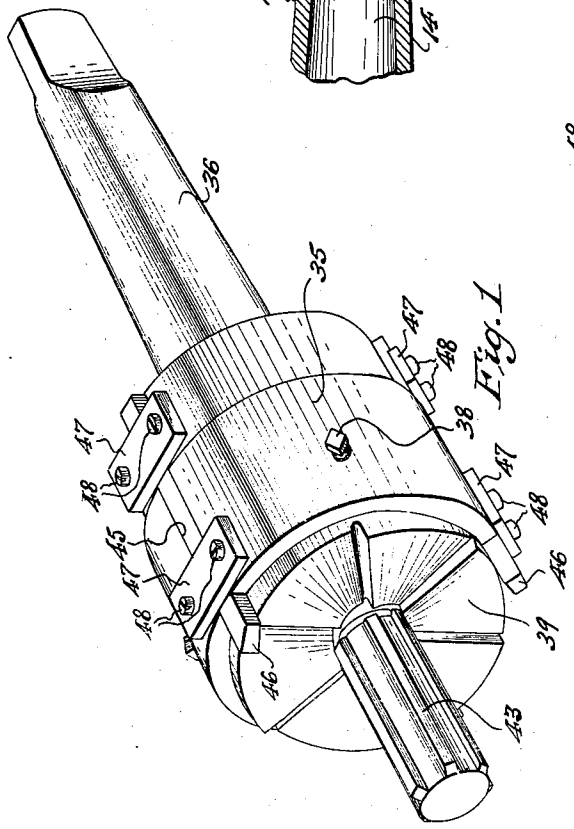

Fig. 1

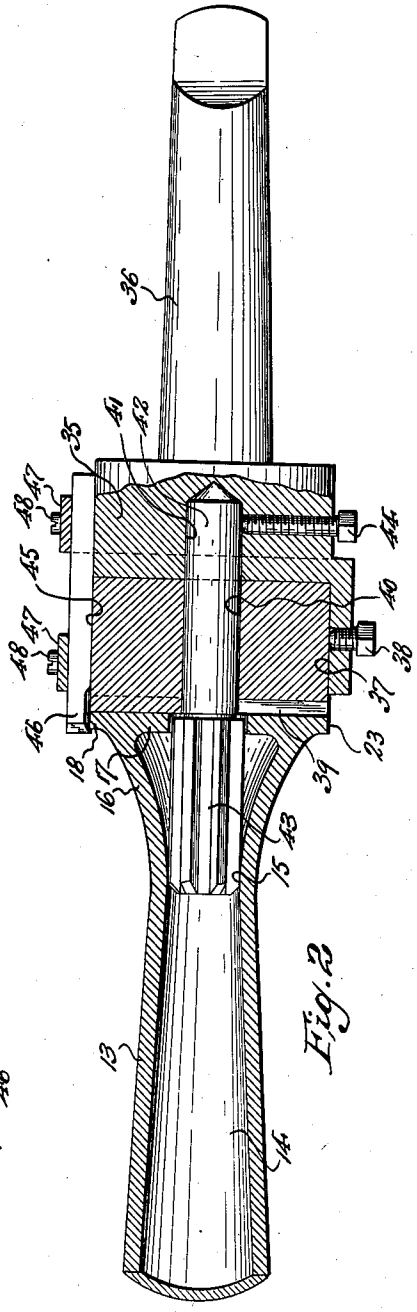

Fig. 2

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GRINDING TOOL

Richard F. Cleary, Maplewood, N. J.

Original application April 20, 1939, Serial No. 268,868. Divided and this application November 18, 1940, Serial No. 366,030

2 Claims. (Cl. 77—58)

This invention relates to a novel tool for shaping the Bunsen burner elements of gas heaters, stoves and the like; this application being a division of my copending application Ser. No. 268,868, filed April 20, 1939.

In Bunsen burners for gas fuel burning apparatus, the production of the desired mixture of combustible gas and air is most efficiently attained by providing, between the gas and air intakes and the burner jets, a restricted throat of the Venturi tube type. The gas is admitted axially to the Venturi throat, while the air is admitted through ports of an air shutter cap radial to the gas admission means. For highest mixing efficiency, it is necessary that the Venturi tube throat be both accurately aligned axially relative to the gas admission port as well as in perfectly true concentric relation thereto at all times. Since, however, in gas heaters, stoves, and the like, as commonly manufactured, the burner fixture, which includes the Venturi portion, is usually made of cast iron, warping of this metal when the casting thereof cools, as well as the roughened and imperfect surfaces left by the sand of the casing molds and cores, tends to leave both the internal and external surfaces of the burner fixture casting deformed and rough. By reason of this it is exceedingly difficult to fit the air shutter cap, which carries the gas admission valve, to the outer flared end of the fixture, so as to attain and maintain the desired axially aligned and concentrically true relation of the gas admission port to the Venturi throat passage. Any surface imperfections and roughness of the restricted areas of the Venturi throat passage also tend to defeat attainment of said desired axially aligned and concentrically true relations, even though the fixture end be machined for fitting the air shutter cap to its face and periphery. Attempts have been made to separably machine the face and periphery of the fixture end, and then to separably bore out the Venturi throat passage, but the results of said separate operations have not been successfully coordinated so as to attain the desired relations sought, and so that said relations are assured at all adjusted positions of the air shutter cap.

Having the above stated conditions in view, the present invention has for an object to provide a novel tool for shaping the burner fixture, whereby the face and periphery of its air shutter cap receiving end and the Venturi throat passage thereof are simultaneously ground so as to relatively coordinate the resulting surfaces whereby the face is truly perpendicular to the axis of the Venturi passage while the periphery is concentrically true to said axis, and at the same time the restricted areas of the Venturi throat passage are likewise concentrically true to said axis.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

Illustrative embodiment of the invention is shown in the accompanying drawing, in which—

Fig. 1 is a perspective view of the novel tool of this invention which is adapted to simultaneously grind and shape the various surfaces of the burner fixture desired to be coordinately related.

Fig. 2 is a longitudinal sectional view of a portion of the burner fixture with said tool operatively applied thereto, said tool also being shown in part section.

Fig. 3 is a fragmentary longitudinal sectional view with parts in elevation showing the burner fixture as ground and shaped by said tool.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

Gas burner fixtures comprise a hollow main body (not shown) of any suitable external and internal shape, to provide an internal fuel mixture supply chamber from which lead the gas burner jets or tips, all as well known to the art. Extending outwardly from the main body is the fuel mixture intake arm 13, the passage 14 of which tapers to a restricted Venturi throat 15, thence flaring outwardly to provide a flared outer end portion 16. The flared outer end portion 16 is provided with an end wall 17, transverse to the longitudinal axis of said intake arm 13, the same terminating in an exteriorly projecting annular flange 18 surrounding said flared outer end portion. Said end wall 17 is provided with a central opening 19, extending from which, in opposite radial directions, are air intake openings 20. Mounted on the outer end of the intake arm 13, so as to be rotatably adjustable thereon, is an air shutter cap 21, said cap having a projecting skirt flange 22 to engage over the peripheral surface 23 of said flange 18 with which the outer end of said intake arm is provided. On its exterior face, said cap is provided with a central outwardly projecting hub 24, provided with an axial bore 25 to receive the discharge end portion 26 of a gas delivery valve 27, which is adapted to be inserted therein in swiveling relation thereto. Formed in said cap, outwardly of said hub 24, are oppositely extending radial air port openings 28 which cooperate with the air intake openings 20 in

the end wall 17 of said intake arm 13. Threaded into said end wall 17 are screw and washer fastening means 29, the washer of which engages the air shutter cap 21, so that, when screwed home, the latter will be secured in desired adjusted position wherein the respective openings 20 and 28 will be so lapped as to provide a properly determined area of air intake opening leading into the intake arm. The gas delivery valve is provided at its discharge end portion 26 with an axial gas port element 30, cooperative with which is an adjustable needle valve 31, for regulating the discharge of gas therethrough. To provide the desired swiveling relation between the gas delivery valve 27 and the air shutter cap 21, the discharge end portion 26 of the former is provided with an annular stop shoulder 32 to engage the exterior end of the hub 24 of the latter, to thereby limit inward axial movement of said gas delivery valve. Said end portion 26 is provided with an external annular channel 33 into which enters, from the air shutter cap 21, the end of a retaining screw 34 for holding the gas delivery valve and air shutter cap 21 in swiveling relation.

In order to assure that the exterior face of the end wall 17 of the intake arm 13 (against which the air shutter cap 21 abuts) is truly perpendicular to the longitudinal axis of said intake arm, while at the same time assuring that the periphery of said end wall (formed by the annular surface 23 of the flange 18) and the internal contour of the Venturi throat 15 are both concentrically true to said axis, these respective surfaces are subject to a novel method of treatment whereby the same are simultaneously ground. To this end, a novel combination tool is provided having a plurality of cutting elements so related as to operatively and simultaneously engage the respective surfaces to be ground when the tool is rotated in contact with the work.

Said tool comprises a body 35 having a tail piece or shank 36 for mounting the same in a suitable driving mechanism. At its forward end said tool body 35 is provided with an outwardly open socket 37, in which is inserted and secured, as by a set screw 38, a face grinding member 39, the radial cutting teeth of which lie in a plane perpendicular to the axis of rotation of the tool. Said face grinding member 39 and the tool body 35 are provided with connecting axial bores 40 and 41 to receive the tail shank 42 of an axially disposed reamer member 43, which is thus arranged to project forwardly beyond said face grinding member. Said reamer member is secured to the tool body 35 by a set screw 44 which extends laterally therethrough into holding engagement with said reamer member tail shank 42. Formed in the external sides of the tool body 35 are one or more longitudinal sealing channels 45 in which are seated cutter tools 46, the operative ends of which project beyond the said face grinding member, with their effective cutting edges lying parallel to the axis of rotation of the tool. These cutter tools are adapted to operatively engage the peripheral annular surface 23 of the intake arm end. Said cutter tools are held in place by clamp plates 47 affixed to said tool body by screws 48 or other suitable fastening means.

When the tool is operatively rotated, the free end of the intake arm 13 of a burner casting is applied thereto, whereby, while the reamer member 43 enters and grinds the Venturi throat 15, the face grinding member grinds the face of the intake arm end wall 17, and the cutter tools 46 engage and grind the external annular peripheral surface 23 of the intake arm end. Since the several grinding members or tools are so coordinated as to maintain their relations to the axis about which the tool rotates, when the face grinding member 39 operatively contacts the end wall surface of the intake arm and the reamer member 43 simultaneously enters and reams out the Venturi throat 15, said end wall surface will of necessity be faced to a plane truly perpendicular to the axis of the intake arm, while the internal contour of the Venturi throat 15 will be ground to concentrically true relation to said axis. At the same time, the external annular peripheral surface 23 of the intake arm end will likewise be ground to concentrically true relation to the axis of the intake arm.

The face of the intake arm end 17 being, by the described grinding operations, trued to a plane perpendicular to the axis of said arm, while the external peripheral surface 23 of the intake arm end is made concentrically true to said axis, when the air shutter cap 21 is applied to said intake arm end, not only will the gas port 30 be accurately aligned with the axis of the intake arm passage, but all risk of disturbing such accurate alignment, during or by rotative adjustment of the air shutter cap, is avoided; and, at the same time the Venturi throat 15 is assured of being in true concentric conformity to the axis of said intake arm, as well as in true axial alignment with the gas delivery port 30.

Having described the present invention, and the advantages thereof, I claim:

1. A tool for the purposes described comprising, a rotatable carrier body having a forwardly open axial socket, a cylindrical wall face grinding member the rearward portion of which is adapted to be secured within said socket, said grinding member having a cutting face at its forward end disposed in a plane perpendicular to the axis of said carrier body, an axial reamer member forwardly projecting from the cutting face of said grinding member, said carrier body having seating channels in its periphery, and wall edge cutters affixed in said channels so as to dispose their effective cutting portions about the periphery of said wall face grinding member and in overhanging relation to the cutting face thereof.

2. A tool for the purposes described comprising, a rotatable carrier having a forwardly open axial socket and a rearwardly extending axial tail shank, a cylindrical wall face grinding member the rearward portion of which is adapted to be removably secured within said socket, the forwardly presented end face of said grinding member having a plurality of radiating cutting elements the operative edges of which lie in a common plane perpendicular to the axis of said carrier body, said grinding member and said carrier body having aligned axial bores, a reamer member projecting forwardly beyond the cutting face of said grinding member and having a tail-piece extending rearwardly through said bores adapted to be removably secured to said carrier body, said carrier body having seating channels in its periphery, and wall edge cutters removably affixed in said channels so as to dispose their effective cutting portions about the periphery of said grinding member and in overhanding relation to the cutting face thereof.

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