

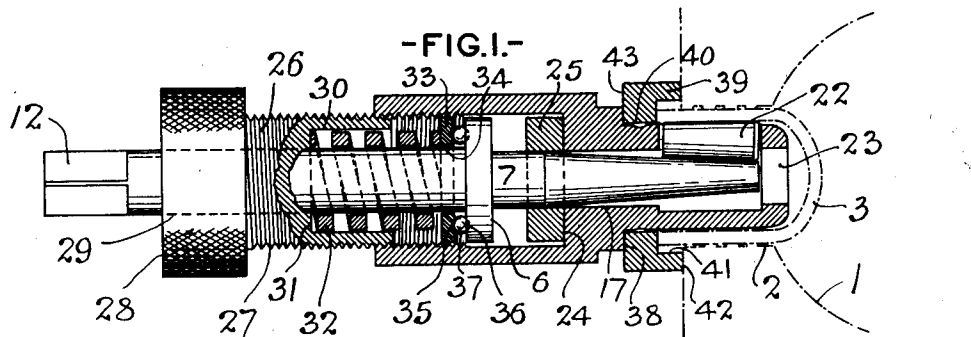
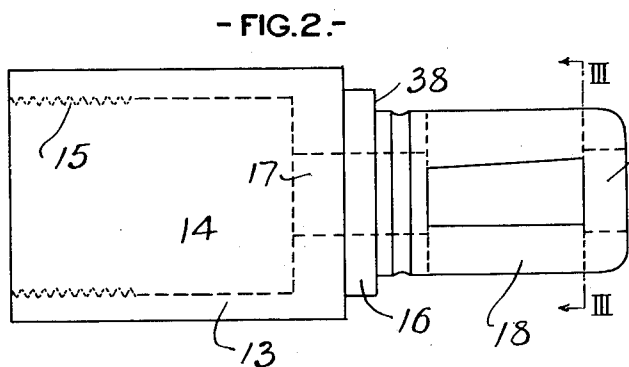
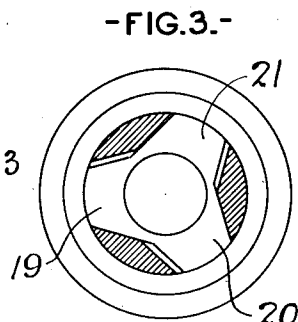
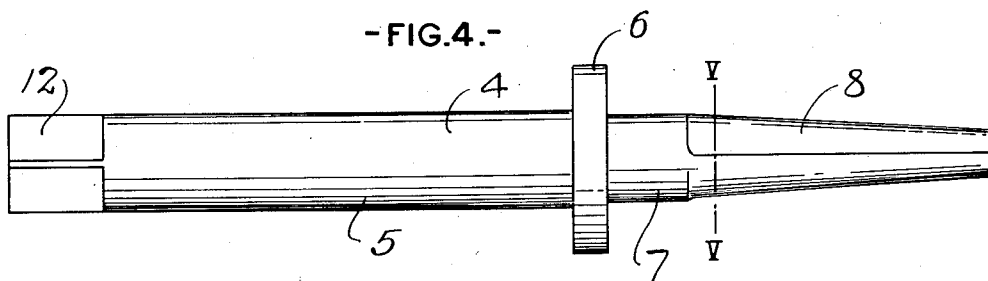
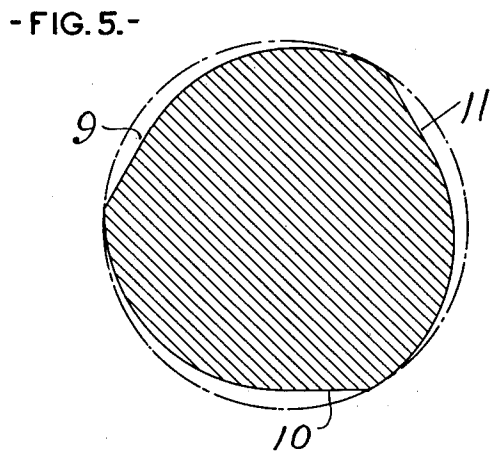
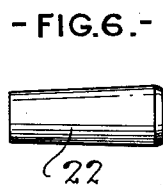
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1,921,810

BOILER PLUG EXPANDER

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BOILER PLUG EXPANDER

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5 Claims. (Cl. 153—82)

The present invention relates to tools, and particularly to an improved tool or device for expanding hollow plugs in openings formed in boiler shells and like apparatus.

Due to the limited amount of space available within such plugs, it has been necessary to employ roller pins with much greater tapers than those applied to expanders under ordinary conditions. Such tapers of the pins necessarily require the rollers of the expander device to be correspondingly tapered. In the use of such devices, however, much difficulty has been experienced in properly feeding the pin so as to complete the expansion operation with a minimum amount of rolling, in order to prevent undesirable flaking of the metal inside of the plug.

The object of the present invention is to provide a device of the character aforescribed, wherein a novel pin and feed arrangement is employed, which will effectively expand the plug with the maximum rapidity, that is to say, with a minimum amount of rolling, practically eliminating undesirable flaking.

The invention is illustrated in the accompanying drawing, wherein, Figure 1 is a longitudinal central sectional view of an expander device embodying the present invention, shown applied to a plug fitted into an opening in a portion of a boiler; Fig. 2 is a side view, on an enlarged scale, of the housing part of the device; Fig. 3 is a transverse sectional view taken on the line III—III of Fig. 2; Fig. 4 is an enlarged side elevation of the roller pin of the device; Fig. 5 is an enlarged transverse sectional view, taken on the line V—V of Fig. 4; and Fig. 6 is an enlarged side elevation of one of the rollers of the device.

Referring in detail to the drawing, a part of a boiler, indicated by the numeral 1, is provided with an opening 2, and a plug 3 of the usual type is fitted into the opening to be expanded therein.

The expander device of the present invention comprises a roller pin 4 having a cylindrical main body portion 5, with an integral collar 6 formed on one end thereof, and a cylindrical portion 7 forward of the collar. Extending forwardly of the portion 7, the end 8, of the pin is tapered and is shaped to provide cam surfaces 9, 10 and 11 so that each third of its circumference will have a .005 cam effect against its respective roller, hereinafter to be described. The rear end 12 of the pin is squared, to engage a motor or other driving member (not shown) of any of the well known designs for rotating the pin.

A cylindrical sleeve member or housing indicated generally by the numeral 13 is provided, and comprises an enlarged hollow portion 14 which is internally threaded for a part of its length at 15, for a purpose hereinafter to be described. The housing has a central portion 16, and a longitudinal passageway 17, circular in cross section, passes through the central portion and the forward end of the portion 14, the passageway being of a slightly larger diameter than the diameter of the portion 7 of the pin. The housing also comprises a hollow end portion 18 extending from the central portion 16. The portion 18 is provided with longitudinal openings 19, 20 and 21 symmetrically formed in its sides and outwardly converging toward the surface of said portion providing cages or sockets for rollers 22. One of the faces of each of the openings is at an angle to the axis of the housing. The rollers are tapered to correspond with the taper of the end 8 of the roller pin, and fit loosely within the openings 19, 20 and 21, so as to be movable in their sockets radially relative to the end portion 18, while being prevented from dropping out of the same because of the restricted distance between their faces at the outer surface of the end portion 18. An opening 23 is formed in the outer end of the portion 18 of the housing through which opening the rollers may be inserted or removed for assembly or repair of the device. The pin is adapted to extend through the housing, its collar 6 being of a slightly less diameter than the interior of the hollow portion 14 of the housing. When the pin is so inserted within the housing, its collar is disposed within the said hollow portion 14 and its tapered end may extend for a limited distance through the opening 23. The difference in the diameters of the passageway 17 and the interior of the hollow portion 14 of the housing provides a ledge 24, and a spacing ring 25 is disposed within the hollow portion 14 adjacent the ledge 24. The central opening of the ring is in alignment with the passageway 17 and is of a diameter slightly greater than the diameter of the cylindrical portion 7 of the pin. The spacing ring acts as a stop against which the collar 6 strikes, limiting the outward movement of the roller pin. A feed or adjusting nut 26 is provided with an externally threaded surface 27, and the nut is screwed into the hollow portion 14, its threaded surface engaging the threading at 15 in the hollow portion 14. An enlarged knurled head 28 is formed on the outer end of the nut and a central bore 29 is formed longitudinally through the nut, the bore being of a di-

iameter slightly greater than the diameter of the central portion 5 of the pin. The pin extends through the bore 29 with its squared end 12 at the rear of the head 28. A part 30 of the body portion of the nut is hollowed out, the interior of the hollow portion being of a diameter greater than that of the bore 29, thereby providing a ledge 31. A spring 32 is disposed around the central portion 5 of the roller pin, and one end of said spring extends into the hollow portion 30 of the nut resting upon the ledge 31. A disc-shaped seat 33 having a central opening 34 formed therein to permit the passage of the pin therethrough, is disposed within the hollow portion 14 of the housing adjacent the forward end of the spring, providing a seat for said end of the spring. Circular channels 35 and 36 are formed in the opposing faces of the seat 33, and the pin collar 6, respectively, and ball bearings 37 are disposed between the seat and collar in the said channels, so that the roller pin may be freely rotated while receiving thrust from the spring.

The end portion 18 of the housing being of a reduced diameter with relation to the central portion 16, a ledge 38 is provided. An annular spacing seat 39, having a central opening 40, is disposed around the end portion 18 of the housing. The opening is of an enlarged diameter at 41 so that when the inner end 42 of the seat bears against the outer surface of the boiler 1, around the outside of the opening 2, the projecting end of the plug 3 may extend into said enlarged portion at 41. The end 18 of the housing member is passed through the opening 40 and the housing bears at its ledge 38, against the outer end 43 of the seat, and the housing is thereby held in a fixed spaced position with relation to the boiler and the plug, as shown in Fig. 1.

In operation, the device is positioned adjacent the boiler, as shown in Fig. 1, with the spacing seat 39 over the end of the plug 3, and the housing as aforesaid extending through the opening 40 and bearing on the spacing seat. When the nut 26 is unscrewed, as shown in Fig. 1, engaging only a few of the threads of the housing, the spring is not under tension and exerts no pressure upon the seat 33. The pin therefore is not forced out against the rollers and the rollers are permitted to recede below the surface of the portion 18 of the housing so that the housing may be inserted within the plug 3 without interference from the rollers. The spring nut may be adjusted by screwing the same inwardly or outwardly to provide the required tension of the spring on the seat 33 so as to force the collar and pin forward, the latter against the rollers. The tapered cam surfaces of the pin will engage the rollers 22, forcing the same outwardly in their respective sockets 19, 20 and 21. The spring will thus afford the pin a steady self-feeding action, and when the pin is rotated, the cam surfaces will cooperate in the transmission of the pressure to the rollers, that is to say, each third of the circumference of the pin will have approximately a .005 cam effect against its respective roller, and a rapid expansion of the plug will be effected with practically no flaking resulting from the action. The housing will turn and hold itself in position during operation through the tendency of the rollers to feed deeper into the plug, by reason of the effect of the slight angles of the faces of the roller sockets 19, 20 and 21, aforesaid.

While there has been hereinbefore described

a specific embodiment of the present invention, it will be apparent to those skilled in the art, that many and various changes and modifications may be made without departing from the spirit of the invention, and it will be understood that all and any such changes and modifications as fall within the scope of the appended claims are contemplated as a part of the present invention.

The invention claimed and desired to be secured by Letters Patent is:

1. A tool for expanding a cylindrical object, comprising an expander member free for lateral movement; a member for forcing said expander member laterally to effect expanding of said object, said forcing member having a surface having a cam effect circumferentially of the forcing member and also a cam effect axially of the forcing member; means for rotating said forcing member to bring said circumferential cam effect into play; and means for feeding the forcing member axially to bring said axial cam effect into play.

2. A tool for expanding a cylindrical object, comprising an expander member free for lateral movement; a member for forcing said expander member laterally to effect expanding of said object, said forcing member having a surface having a cam effect circumferentially of the forcing member and also a cam effect axially of the forcing member; means for rotating said forcing member to bring said circumferential cam effect into play; and means for feeding the forcing member axially to bring said axial cam effect into play, said rotating means being capable of operation simultaneously with said axial feeding means.

3. A tool for expanding a cylindrical object, comprising a housing; a member held in an end of said housing free for lateral movement for expanding said object; means extending through said housing and engaging said expanding member for forcing said expanding member outwardly; means for rotating said forcing means; a member threaded into the end of the housing opposite said first mentioned end; means at the outer end of said threaded member for turning the threaded member into the housing; a chamber disposed in the opposite end of said threaded member; a seat secured to said forcing means; and a spring disposed in said housing and said chamber, having one of its ends abutting said seat, and its opposite end abutting the outer end of said chamber, whereby the forcing means may be advanced toward the expanding member by the resilient pressure of the spring when the threaded member is advanced.

4. A tool for expanding a cylindrical object comprising an expander member free for lateral outward movement for expanding said object; a member rotatable and axially advanceable for forcing said expander member laterally outward, said forcing member being provided with a surface having a cam effect axially of the forcing member operable during axial advancement thereof, and also having a cam effect circumferentially of the forcing member operable during a part of each rotation thereof; means for rotating said forcing member; and means for axially advancing said forcing member, said rotating means being capable of operation simultaneously with said advancing means, whereby said forcing member will axially advance previous to each said part rotation thereof to there-

by successively bring axial and circumferential cam effects into play.

5 5. A tool for expanding a cylindrical object comprising an expander member free for lateral outward movement for expanding said object; a member rotatable and axially advanceable for forcing said expander member laterally outward, said forcing member being provided with a surface having a cam effect axially of the
10 forcing member operable during axial advancement thereof, and also having a cam effect circumferentially of the forcing member operable

during a part of each rotation thereof; means for rotating said forcing member; and spring means held under compression for constantly urging said forcing member axially in advancing direction, said rotating means being capable of operation simultaneously with said spring means, whereby said forcing member will be axially advanced previous to each said part rotation thereof to thereby successively bring axial and circumferential cam effects into play. 80
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