

Feb. 28, 1967

H. E. REICHERT

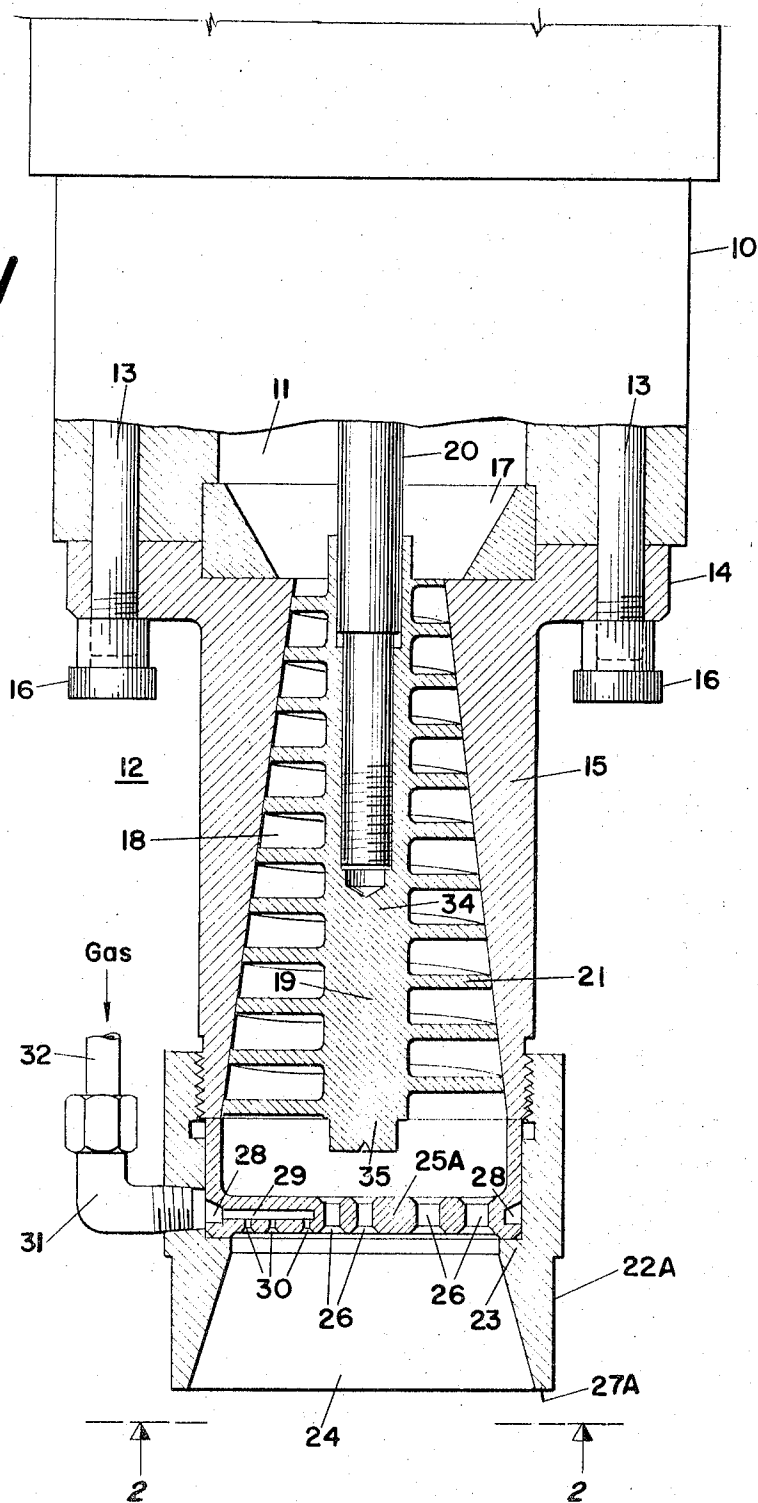
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URETHANE-FOAM MIXING HEAD

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Fig. 1



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Fig. 2

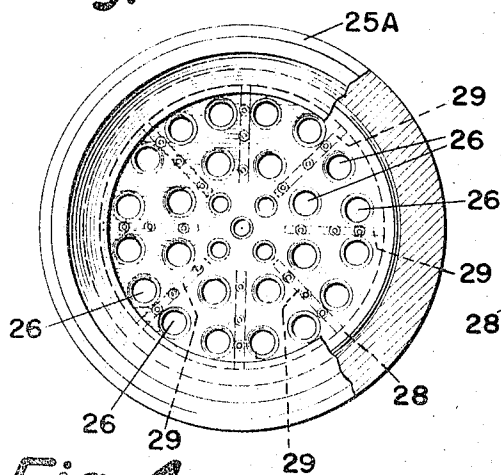


Fig. 3

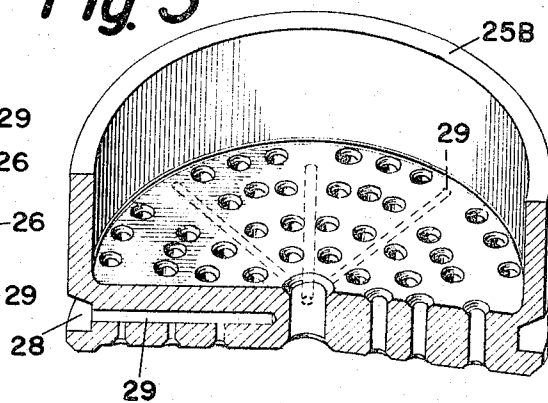


Fig. 4

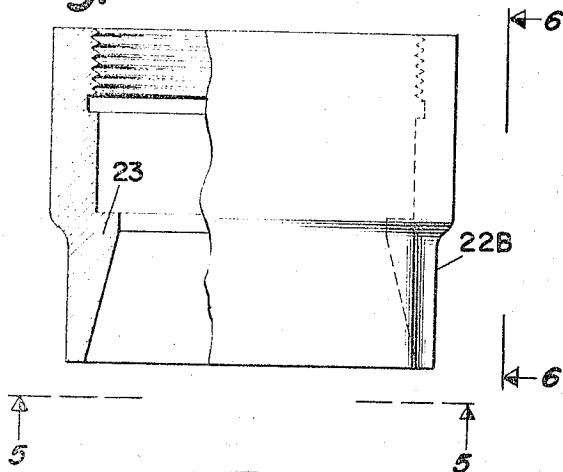


Fig. 6

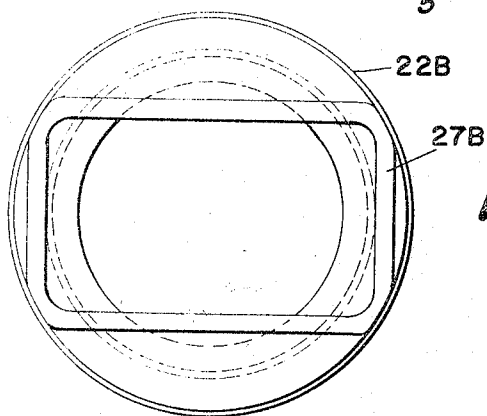
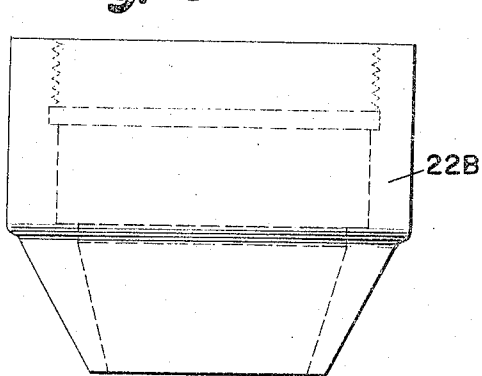


Fig. 5

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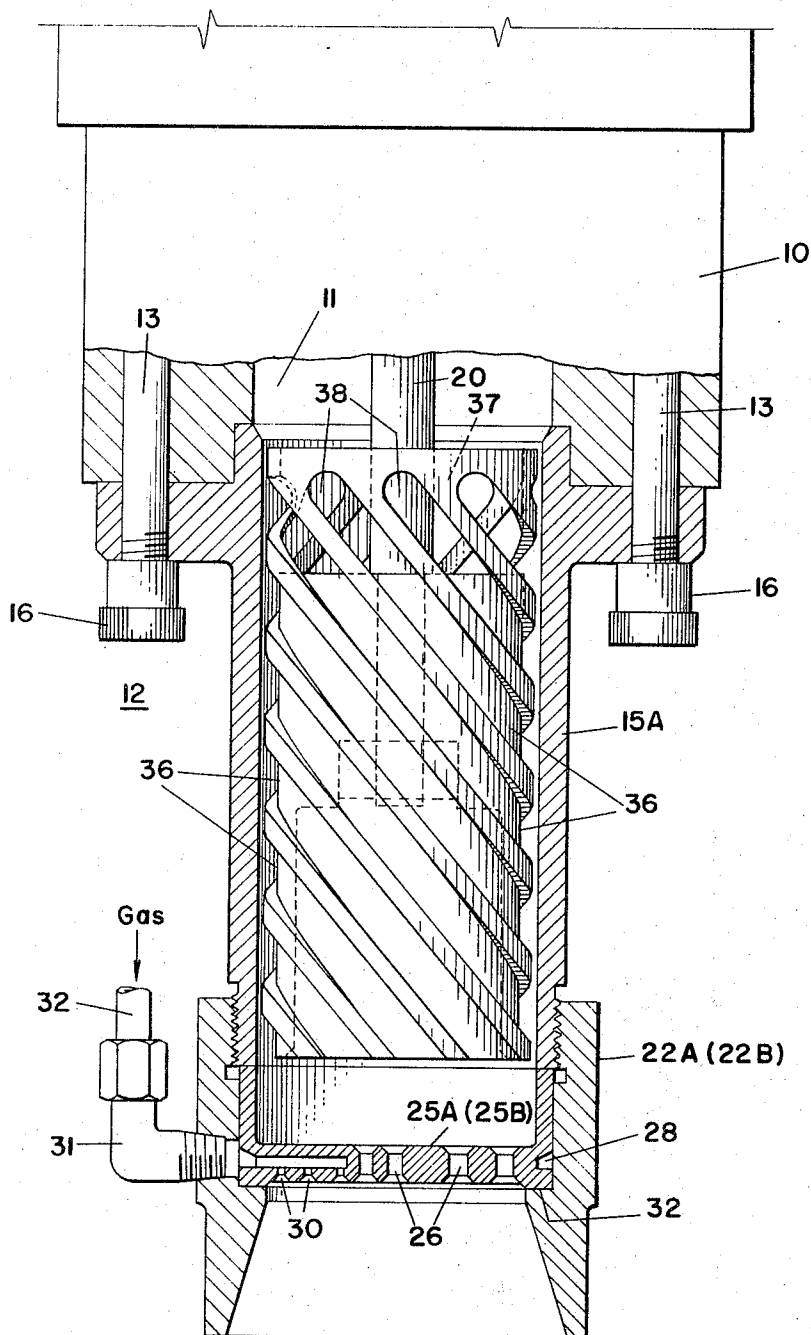
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Fig. 7



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URETHANE-FOAM MIXING HEAD

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Filed Aug. 20, 1964, Ser. No. 390,862

5 Claims. (Cl. 239-142)

This invention relates to apparatus suited to produce and dispense urethane foam, and particularly relates to a dispensing attachment for a foam-mixing head.

In accordance with the present invention, the foam-dispenser is an assembly comprising a hollow nose cone or nozzle structure whose foam passage is bridged by a spray-cup or plate having two-hole patterns. The holes of one pattern extend through the plate for passage of the foam in relatively slow-moving streams and the holes of the other pattern provide gas-ports only in the discharge face of the plate. The gas-ports are connected by passages extending between opposite faces of the plate to a nose-cone fitting which, during operation of the dispenser, is connected for supply of air, for example, under suitably high pressure. The jets of gas issuing from the ports of the spray plate provide a conveying vehicle for the foam so that it is discharged as a spray from the nose cone.

Further in accordance with the invention, the discharge end of the nose cone passage is contoured to cooperate with the hole patterns of the spray plate to provide a desired spray pattern of the foam discharged from the nose cone. More particularly, differently contoured nose cones and spray plates having different hole patterns may be replaceably used in different combinations to make available to the user a variety of spray patterns.

Also in preferred forms of the invention, the nose cone is removably attached to an agitator housing in turn attached to the mixing head to which the foam-producing materials are supplied in desired proportions. The dispensing attachment including the nose cone, spray plate, agitator housing and other parts may be simply and quickly disassembled for thorough cleaning and subsequent re-assembly.

The invention further resides in foam-producing and dispensing devices having novel and useful features of construction, combination and arrangement hereinafter described and claimed.

For a more detailed understanding of the invention, reference is made to the following description of a preferred embodiment thereof and to the accompanying drawings in which:

FIG. 1 is a side elevational view, mainly in section, showing assembled components of the dispensing attachment as mounted on a mixing head;

FIG. 2 is a plan view, partly in section, of the spray plate of FIG. 1;

FIG. 3 is a perspective view, in section, of a spray plate similar to FIG. 2 but having a different hole pattern;

FIGS. 4, 5 and 6 are respectively side, bottom and end views of a modification of the nose cone or nozzle of FIG. 1; and

FIG. 7 shows a dispenser assembly similar to FIG. 1 with different agitator and agitator-housing components.

Referring to FIG. 1, the block 10 is exemplary of a mixing head having valves (not shown) for admitting, in desired proportions, resin and catalyst ingredients, for example, reacted to produce urethane foam. The reaction starts in the chamber 11 of head block 10 to which the foam-producing materials are supplied.

The foam-dispenser assembly 12 is removably held to the lower face of mixing head 10 in communication with the mixing chamber 11. Specifically, the studs or bolts 13 extend through the flange 14 of the dispenser housing

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15 and are threadably received by the clamping nuts 16. The lower end of the chamber 11 of the head and the upper end of housing 15 are recessed to receive the deflector cup or ring 17 which is thus retained in position when the housing 15 is clamped against the mixing head 10. The cup 17 is oriented with the larger end of its tapered bore or passage facing into the chamber 11 and with its smaller end facing into the upper end of the chamber or passage 18 extending through the housing of the dispenser. The passage 18, which is of circular and downwardly expanding cross section, receives the correspondingly tapered helical agitator 19 attached to the lower end of shaft 20. Specifically, the lower portion of shaft 20 extends deeply into a socket of hub 34 of the agitator with its lower end threadably received by the hub. The edges of the tapered spiral or helix 21 of the agitator tightly engage the wall of the bore 18 of the housing so to define a tortuous elongated second chamber or passage along which the reacting mixture is forced to travel in a helical path about the agitator axis by pressure of the materials supplied to chamber 11. The agitator 19 may additionally be used as a feed-auger by using spacer washers in the hub socket between the bottom of its upper larger diameter recess and the shoulder formed at the reduced diameter end portion of the shaft so to provide a slight clearance between the edges of the agitator spiral 21 and the wall of bore 18 of the housing and by driving the shaft 20 from a motor (not shown) mounted on the mixing head or adjacent thereto.

The lower end of the dispenser housing 15 is externally threaded to receive the upper end of the hollow nose cone 22A. The shoulder or ledge 23 intermediate the ends of the nose-cone passage 24 is provided to engage the marginal area of the lower face of the removable spray plate or cup 25A. With the nose cone screwed into place, the upper marginal face or rim of cup 25A is forced against the annular lower edge of the agitator housing 15 in alignment with its bore 18.

The bottom or plate area of cup 25A, or equivalent, is provided with a plurality of holes 26 extending entirely through the plate for passage of foam from chamber 18 to the discharge or nozzle end of the nose-cone passage 24.

In the nose cone 22A (FIGS. 1 and 2), the discharge passage below ledge 23 is of circular cross section throughout, the diameter increasing towards the discharge tip 27A. The outer periphery of the relatively thick spray plate 25A has a peripheral groove 28 connected to radial passages 29 (FIGS. 1, 2), each of which is connected to radially spaced ports or holes 30 which open only to the lower or discharge face of spray plate 25A. Thus, for any angular position of the plate or cup 25A, all of the ports 30 are in communication with the pipe-fitting 31 screwed into the side of the nose cone. The fitting is in turn connected as by flexible tubing 32 to a supply source of air or other gas at suitably high pressure.

Thus, air for example is supplied to the ports 30 as a means or vehicle for conveying the completely mixed foam from the under face of plate 25A in a spray pattern jointly determined by the hole patterns of the spray plate and by the contour of the discharge passage of the nose cone. It is to be noted that at no point before final mixing of the foam material does air come into contact therewith: air is used only as a conveying medium. By way of example, in absence of supply of air to ports 30, the foam would issue from the nose cone in the form of slow-moving streams whereas when pressurized air is supplied to ports 30, the foam is discharged in the form of a fine spray of high-velocity jets.

Different spray patterns suited for different foam mixtures or different applications of the foam can be obtained

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by changing the spray plate and/or the nose cone. FIGS. 2 and 3 are exemplary of two spray plates 25A and 25B whose respective hole patterns differ as to the size, number and position of the holes. The discharge passage of nose cone 22A (FIGS. 1 and 2) expands, as above described, outwardly and downwardly from the circular aperture formed by shoulder 23 to the larger circular opening of the discharge tip 27A whereas for the nose cone 22B (FIGS. 4-6), the discharge passage from the circular ledge aperture contracts in one direction and expands in another towards the discharge tip 27B to form a rectangular orifice (FIG. 5) whose width and length are respectively smaller and greater than the radius of the spray plate and of the passage.

With the construction shown, the spray pattern can be changed by unscrewing the nose cone, with the housing 15 still mounted on the mixing head, so to free both the nose cone and the spray plate in use for replacement of either or both of them.

Also with the construction shown, all components of the dispensing attachment 12 and the mixing chamber of the head 10 are accessible for cleaning of all areas on which the foam may harden simply by unscrewing the nose cone from housing 15, unscrewing the agitator 19 from shaft 20, and detaching the housing 15 from the mixing head by removing the nuts 16. With the nose cone removed from housing 15, the shaped end 35 at the lower end of the agitator hub 34 is accessible to receive a suitable wrench for unscrewing the agitator from shaft 20. Removing the clamping nuts 16 releases both the housing 15 and the deflector cup 17 from the mixing head. After cleaning of the now-open chamber 11 of the mixing head 10 and of the disassembled elements of the dispenser, the dispenser attachment is re-assembled by fastening its housing 15 to head 10 with deflector cup 17 between them, fastening the agitator 19 to shaft 20 within housing 15, and then screwing the selected nose cone 22A or 22B with the selected spray plate 25A or 25B therein onto the housing 15.

The internally tapered housing 15 and tapered agitator 19 of FIG. 1 may be replaced by the housing 15A and agitator 19A of FIG. 7. In this dispenser modification, the agitator 19A is cylindrical and is rotated, at suitably high speed by shaft 20, in the constant diameter mixing chamber 18A of housing 15A. The upper compartment 37 of the rotating agitator receives the foam mixture from chamber 11 of the mixing head 10. The mixture is forced, mainly by centrifugal action, through the holes 38 in the walls of that compartment to the clearance space between the outer surface of the agitator and the inner surface of chamber 18A. The spiral grooves 36 in the outer face of the agitator feed the reacting mixture toward the spray plate (25A or 25B) in the nose cone (22A or 22B) concurrently with stirring or mixing. A smaller number of reverse spiral grooves (not shown) may additionally be provided to reduce the rate of feed of the foam mixture and to prolong the time of its mixing by agitator 19A.

As should be evident from the drawings, the dispenser of FIG. 7 may be easily and quickly disassembled for thorough cleaning and its spray pattern may be readily changed to use any of the spray-plate and nose-cone com-

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binations: all in the same manner as previously discussed in connection with FIGS. 1 to 6.

It shall be understood the invention is not limited to the specific construction illustrated and described, but also comprehends equivalent modifications within the scope of the appended claims.

What is claimed is:

1. A dispenser attachment for a foam-mixing head comprising

a hollow nose cone having a passage which at one end receives material from said head for discharge from the opposite end,

a spray plate extending across said passage intermediate said ends thereof, said plate having holes extending therethrough for passage of said material and having passages extending intermediate opposite faces of the plate to ports opening only on the discharge face of the plate,

said nose cone having a fitting for supply of gas under pressure to the port passages of said spray plate,

a housing removably attached at one end to the mixing head for communication with a mixing chamber thereof and at its other end provided with means for detachably receiving said nose cone, and

a helical agitator removably attached to a shaft extending through and beyond said mixing chamber into said housing.

2. A dispenser attachment as in claim 1 additionally including a deflector ring received by and clamped between adjacent ends of the housing and mixing head to direct foam-producing materials in said mixing chamber to the helical agitator in said housing.

3. A dispenser attachment as in claim 1 in which the spray plate is cup-shaped and releasably held in position by engagement with the discharge end of said housing and a shoulder intermediate the ends of said passage of the nose cone.

4. A dispenser attachment as in claim 1 in which the spray plate is snugly received by said passage of the nose cone, the engaging surfaces of said plate and nosecone passage having a peripheral groove in at least one of them for communication between said fitting of the nose cone and said port passages of the spray plate.

5. A dispenser attachment as in claim 1 in which the nose-cone passage is contoured beyond the spray-plate structure for cooperation with the hole patterns of the spray plate in determining the spray pattern of the foam as conveyed beyond the nose cone by the gas from said ports.

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