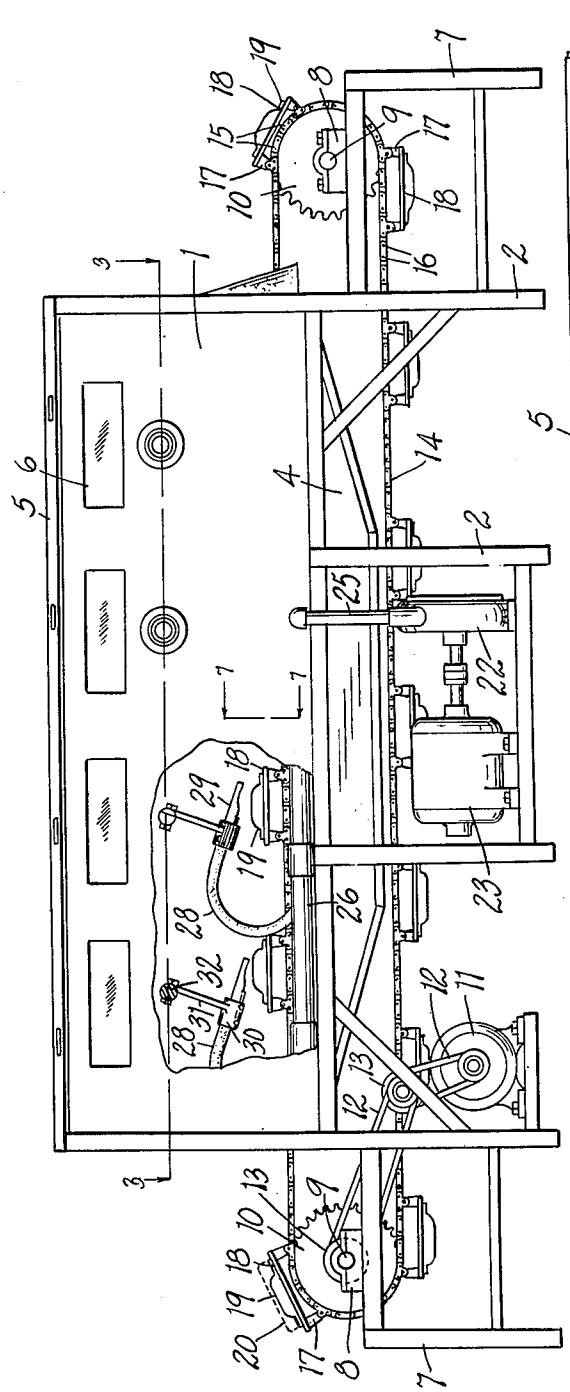
Jan. 13, 1953 H. J. VANDER WAL 2,624,982

MACHINE FOR POLISHING AND BUFFING ARTICLES WITH ABRASIVE CARRYING FLUIDS

Filed Dec. 30, 1949 2 SHEETS—SHEET 1



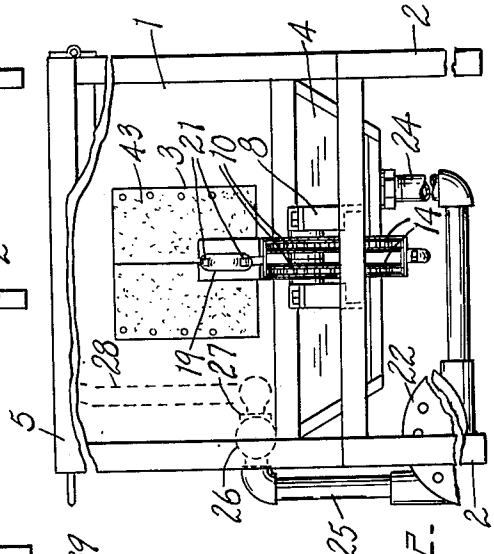


FIG. 2.

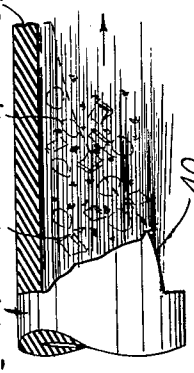


FIG. 6.

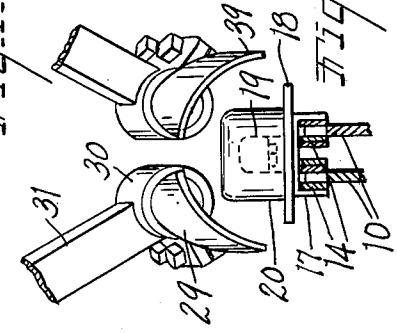


FIG. 7.

FIG. 1.

INVENTOR.
Henry J. Vander Wal
BY
ATTORNEY.

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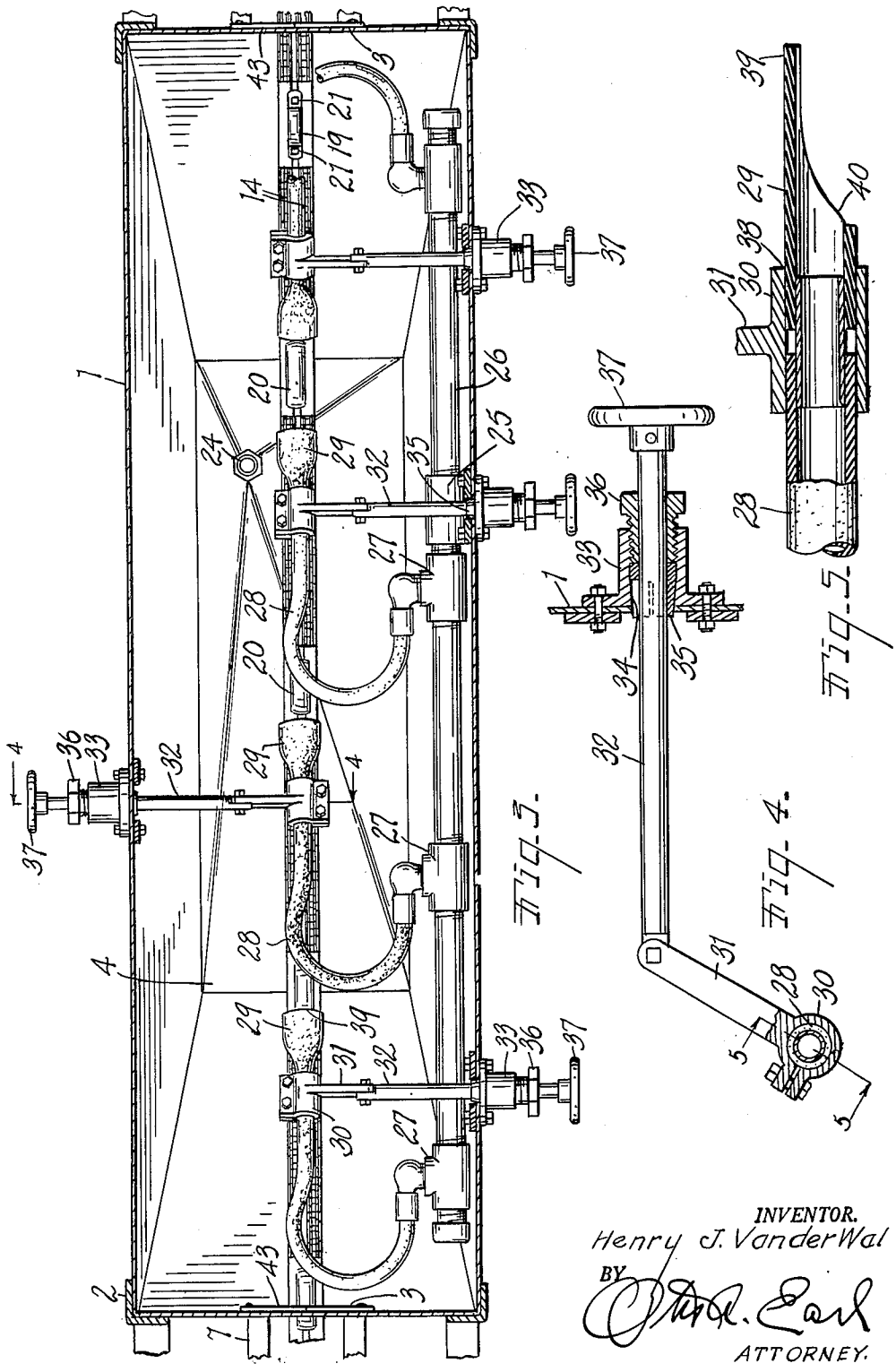


FIG. 3.

FIG. 5.

FIG. 4.

INVENTOR.
Henry J. VanderWal
BY
ATTORNEY.

Patented Jan. 13, 1953 2,624,982

UNITED STATES PATENT OFFICE

2,624,982

MACHINE FOR POLISHING AND BUFFING ARTICLES WITH ABRASIVE CARRYING FLUIDS

Henry J. Vander Wal, Grandville, Mich., assignor to Wagner Brothers, Inc., Highland Park, Mich., a corporation of Michigan

Application December 30, 1949, Serial No. 135,922

17 Claims. (Cl. 51—14)

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This invention relates to improvements in a machine for polishing and buffing articles with abrasive carrying fluids.

The principal objects of this invention are:

First, to provide a machine for rapidly and effectively polishing or buffing a series of similar or dissimilar articles by causing the articles to be translated through a plurality of jets of abrasive suspended in liquid.

Second, to provide means for effectively directing a plurality of jets of abrasive carrying liquid against all surfaces of an article to be buffed or polished so as to completely buff or polish the article.

Third, to provide a liquid jet type of buffing or polishing machine which is easily adaptable and adjustable to effectively buff or polish a wide variety of articles.

Fourth, to provide an efficient buffing and polishing machine of the jet type which is inexpensive to manufacture and operate.

Other objects and advantages relating to details of my invention will be apparent from a consideration of the following description and claims. The drawings, of which there are two sheets, illustrate a preferred form of my polishing and buffing machine.

Fig. 1 is a side elevational view of my machine with portions of the cabinet thereof broken away.

Fig. 2 is an end elevational view of the machine viewed from the right as shown in Fig. 1 and illustrating the exit end for articles to be polished.

Fig. 3 is an enlarged fragmentary horizontal cross sectional view taken along the plane of the line 3—3 in Fig. 1.

Fig. 4 is an enlarged fragmentary cross sectional view taken along the plane of the line 4—4 in Fig. 3 and illustrating the mounting of one of the nozzles.

Fig. 5 is a fragmentary longitudinal cross sectional view through one of the nozzles of my machine taken along the plane of the line 5—5 in Fig. 4.

Fig. 6 is an enlarged fragmentary cross sectional view through the tip of the nozzle in Figs. 1 and 3 and illustrating the type of jet obtained therefrom.

Fig. 7 is a transverse cross sectional view through the conveyor taken along the line 7—7 in Fig. 1 and illustrating one possible adjustment of the nozzles to obtain buffing action on the sides of a work piece.

My machine consists generally of a longitudinally elongated cabinet 1 supported upon suitable legs 2 and having openings 3 formed in each end

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thereof. A fluid receiving tank or sump 4 forms the bottom of the cabinet and a hinged cover 5 is provided at the top of the cabinet permitting access to the interior thereof. Desirably transparent viewing windows 6 are set into one side wall of the cabinet.

Projecting from each end of the cabinet and its legs are frame-like supports 7 having the transversely disposed bearings 8 supported on the tops thereof. The bearings 8 rotatably support the sprocket shafts 9 on which pairs of sprocket wheels 10 are mounted. The left pair of sprocket wheels 10 is connected to be driven from the motor 11 by means of the belts 12 and pulleys 13. The sprocket wheels 10 are so located with respect to the cabinet 1 and end openings 3 that a pair of conveyor chains 14 trained around the wheels and driven by the left pair of wheels 10 will have their upper reaches extending through the door openings and longitudinally along the lower portion of the cabinet. The lower reach of the conveyor extends longitudinally below the tank or sump 4.

The chains 14 are of the link type having a plurality of single links 15 pivotally connected by the pins 16 to double links 15A. Transversely spaced pairs of the single links 15 on the pair of chains have the outwardly projecting U-shaped brackets 17 pivotally connected thereto. (See Fig. 7.) The outer ends or bases of adjacent pairs of the brackets 17 are permanently connected as is best shown by the longitudinally extending plates 18. The plates 18 are apertured intermediate of their ends to receive bolts for securing the work holders 19 of various shapes to the plates. The holders are adapted to form supports for a variety of articles to be buffed or polished as indicated at 20. The holders are held in place by the removable bolts 21 and are readily removable to mount different holders. The holders 19 are mounted at spaced intervals along the conveyor as illustrated.

Supported beneath the tank 4 is a centrifugal pump 22 driven by the motor 23. The pump has an inlet or suction conduit 24 opening to the bottom of the tank 4 and connected to the pump as will be readily understood. The pump is provided with an outlet supply pipe 25 connected to a manifold 26 extending longitudinally along one side of the cabinet. The manifold 26 is provided with a plurality of longitudinally spaced T couplings 27 to which are attached a plurality of rubber or other flexible tubes 28. Each of the tubes 28 is provided on its end with a flared nozzle 29. The nozzles and the end of the tubes are

joined and secured within split clamping sleeves **30**, and each sleeve has a radially projecting support arm **31**. The outer ends of the arms **31** are adjustably bolted to flats on the inner ends of adjusting rods **32** projecting through the side walls of the cabinets. As illustrated, one or more of the rods may project through opposite sides of the cabinet.

As is most clearly illustrated in Figs. 3 and 4, rods **32** project through bushings or housings **33** secured to the side walls of the cabinet. The bushings **33** form tapered bores **34** engageable with the jaws **35** to form a grip or chuck for clamping the rods in the bushings. The outer ends of the bushings **33** are internally threaded to receive the nuts **36** for forcing the jaws into clamping engagement with the rods. Hand wheels **37** are secured to the outer ends of the rods.

In adjusting the machine for buffing operation on any given type of work piece, the nozzles can be placed in the desired relationship with respect to the conveyor and the work pieces thereon by adjusting the several supporting connections for the nozzles. For buffing the tops and ends of a relatively narrow work piece, the rods **32** are adjusted longitudinally through the bushings **33**, and the support arms **31** are set at such an angle with respect to the rods that the nozzles will be positioned in a longitudinally inclined position over the work pieces. Rotation of the rods **32** in the bushings adjusts the angle of inclination of the nozzles. When the nozzles are properly adjusted, the nuts **36** are tightened to clamp the nozzles in adjusted position.

When it is desired to buff the sides of a work piece as is illustrated in Fig. 7, the rods **32** and arms **31** of successive nozzles are adjusted to locate the nozzles slightly to either side of the conveyor and in an inclined position. The slit sleeves **30** are then loosened, and the nozzles **29** are twisted slightly about the axis of the sleeve to direct the jet of the nozzle along the sides of the work piece.

Particular attention is invited to Figs. 5 and 6 of the drawings which illustrate one of the nozzles **29**. The nozzle is preferably formed of molded hard rubber or other abrasive resistant material and is provided with an inner tubular end **38** of approximately the same inner diameter as the tube **28**. The outer or discharge end of the nozzle is provided with a forwardly projecting flared upper lip **39**, the inner edge of which is approximately tangential with the inner end of the bore of the nozzle. The bottom of the discharge end of the nozzle is cut away behind the lip **39** as at **40** and merges with the edges of the lip along smoothly flared lines. The shape of the nozzle causes the stream of abrasive carrying liquid discharged through the nozzle to be projected in a generally straight jet which expands slightly toward the work piece, and the abrasive particles in the stream of liquid are caused to impinge in almost tangential fashion against the surface of the work piece.

The fluid which I employ in my buffng machine varies with the type or hardness of the work piece but consists of a general type of mixture. For buffing relatively soft materials such as zinc die castings, aluminum and brass, I use a mixture of one gallon of Tripoli paste (medium size), one pint of refined clear mineral oil, one quart of sponge rubber, pea size pieces, **41** (see Fig. 6), three quarts of medium hard felt pea size pieces **42** (see Fig. 6), and sufficient oleic acid to form a mixture with the above materials of heavy cream-like consistency. To buff steel and other hard materials, I use one gallon of Tripoli paste (coarse size), one-half pint of mineral oil, one quart of sponge rubber, pea size pieces, four quarts of hard felt pea size pieces, one cup of aluminum oxide, fine flour grade, and sufficient oleic acid mixture with the above ingredients to provide a heavy cream-like fluid. A sufficient quantity of the foregoing mixtures is provided to insure a continuous supply of the liquid from the sump to the pump and nozzles. The quantity will, of course, vary with the size of the machine and the number of nozzles in use.

The mineral oil is believed to lubricate the felt and rubber pieces in passing through the pump and tubing. The pea size of the pieces is intended to include a range of ⅛ inch to ½ inch in longest dimension. I believe that the pores of the sponge rubber carry the abrasive into close adhering contact with the surface of the work and that the felt or any similar deformable solid wipes the abrasive along the surface as the felt is discharged against the work. Oleic acid is used as a fluid carrier, as it is non-corrosive and non-rusting and can be easily washed from the work.

The pressure with which the mixture is projected against the work naturally has considerable effect upon the rate with which the work is abraded or polished. Mixture projected at low pressure will abrade more slowly than mixture projected at high pressure. As a practical solution I prefer to employ pressures of around 200 pounds per square inch or higher when polishing and buffing articles that are now commonly furnished with high finishes.

Desirably the last nozzle near the exit end of the conveyor is directed reversely toward the incoming conveyor and work piece in order to buff the leading end of the work piece and to minimize the amount of abrasive liquid which will escape through the opening **3** in the exit end of the cabinet. Flexible flaps or curtains **43** are provided on the end openings to further prevent loss of the abrasive liquid.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination with a chain conveyor having a series of article supports mounted therealong, article engaging holders removably secured to said supports, walls forming an enclosure about the upper reach of said conveyor, a sump tank closing the bottom of said enclosure below said upper reach, a plurality of rod elements extending laterally through the side walls of said enclosure, internally threaded bushings on said walls embracing said rod elements, jaws and screws in said bushings for gripping said rods, support arms transversely pivoted on the inner ends of said arms, nozzle elements rotatively adjustably supported on the swingable ends of said arms and disposed above said conveyor, handles on the outer ends of said rod elements, flexible tubes for supplying abrasive suspended in a liquid to said nozzles, and a pump and manifold for recirculating said liquid from said tank to said tubes under pressure.

2. In combination with a conveyor having a series of article supports mounted therealong, article engaging holders removably secured to said supports, walls forming an enclosure to said supports, walls forming an enclosure about the upper reach of said conveyor, a sump tank in the bottom of said enclosure below said upper reach,

a plurality of rod elements extending laterally through the walls of said enclosure, internally threaded bushings on said walls embracing said rod elements, jaws in said bushings for selectively gripping said rods at adjusted intervals therealong, support arms pivoted transversely on the inner ends of said rods, nozzle elements adjustably supported on the inner ends of said rod elements and disposed above said conveyor, handles on the outer ends of said rod elements, a charge of abradant carrying liquid in said tank, tubes for supplying said liquid to said nozzles, and a pump and manifold for recirculating said liquid from said tank to said tubes.

3. In combination with a work advancing means having a series of article holders mounted therealong, walls forming an enclosure about one reach of said means, a sump tank associated with said enclosure, a plurality of nozzle elements adjustably supported from the walls of said enclosure and disposed longitudinally over said one reach, means for adjusting the angular position of said nozzles relative to said one reach, tubes for supplying liquid to said nozzles, a pump and manifold for recirculating said liquid from said tank to said tubes at a pressure in excess of 200 lbs. per square inch, and a charge of liquid in said tank including an abrasive and small pieces of felt and sponge rubber.

4. In combination with a work advancing means having a series of article holders mounted therealong, walls forming an enclosure about one reach of said means, a sump tank associated with said enclosure, a plurality of nozzle elements adjustably supported within said enclosure and disposed longitudinally over said one reach, means for adjusting the angular position of said nozzles relative to said one reach, tubes for supplying liquid to said nozzles, a pump and manifold for recirculating said liquid from said tank to said tubes at a pressure in excess of 200 lbs. per square inch, and a charge of liquid in said tank including an abrasive and small pieces of a bendable solid.

5. In a liquid buffing and polishing machine, the combination of an elongated cabinet having openings in the ends thereof, a sump tank closing the bottom of said cabinet, means rotatably supporting a conveyor with its upper reach extending through said openings and longitudinally through said cabinet, work holders removably secured at intervals along said conveyor, a fluid pump mounted on said machine and having an inlet connection opening to said tank, a manifold extending longitudinally within said cabinet and connected to the outlet of said pump, a plurality of flexible tubes connected to said manifold at spaced intervals therealong, nozzles rotatively mounted on the free ends of said tubes, means supported from the side walls of said cabinet and adjustably supporting said nozzles above said upper reach to discharge at various angles against work on said holders, and a charge of abradant liquid having pieces of porous bendable solids mixed therewith contained in said tank.

6. In a buffing and polishing machine, the combination of a cabinet having a drain sump associated therewith, a pump having an intake opening to said sump, an endless conveyor having a plurality of work holders arranged therealong, the conveyor being supported at the ends of the cabinet so that its upper reach traverses the cabinet, and a plurality of nozzles mounted within said cabinet and spaced along said conveyor for independent adjustment to direct the discharge from the nozzles against the work as it is translated through the cabinet by the conveyor, said nozzles being connected to said pump, said cabinet having support members associated with the individual nozzles and projecting through the sides of the cabinet facilitating the adjustment of the discharge of the nozzles relative to the work as it is translated through the cabinet.

7. In a buffing and polishing machine, the combination of a cabinet having a drain sump associated therewith, a pump having an intake opening to said sump, work advancing means having a plurality of work holders arranged therealong, the advancing means being supported so that it traverses the cabinet, and a plurality of nozzles mounted within said cabinet in series and for independent adjustment to direct the discharge from the nozzles against the work as it is translated through the cabinet, said nozzles being connected to said pump, said cabinet having support members associated with the individual nozzles and projecting through the walls of the cabinet facilitating the adjustment of the discharge of the nozzles relative to the work as it is translated through the cabinet.

8. An apparatus of the class described comprising means for translating work to be treated in a predetermined path, a nozzle mounted for adjustment for directing its discharge at selected angles of impingement upon the work as it is being translated, said nozzle having a rubber orifice, and an elongated transversely curved forwardly projecting rubber nose portion above the orifice and open on its underside, means for supplying the nozzle with an abradant comprising a vehicle under blast pressure, said vehicle being of cream-like consistency, a multiplicity of fragments of yieldable nonmetallic material of the order of one-fourth inch in diameter, and an abradant, the fragments comprising sponge rubber and felt in approximate proportions of one part of sponge rubber to three parts of felt.

9. An apparatus of the class described comprising means for translating work to be treated in a predetermined path, a nozzle mounted for adjustment for directing its discharge at selected angles of impingement upon the work as it is being translated, a supply of abradant comprising a vehicle under blast pressure, a multiplicity of fragments of yieldable nonmetallic material, and an abradant, and means for delivering said abradant to said nozzle.

10. An apparatus of the class described comprising means for translating a plurality of workpieces in succession in a predetermined path, a plurality of nozzles spaced along said path and mounted for adjustment relative thereto to direct the discharge therefrom across the path and into impinging blast engagement with the workpieces as they are successively translated through the discharges of the nozzles, a supply of abradant composition under blast pressure, the composition comprising a liquid vehicle, a multiplicity of small fragments of yieldable nonmetallic material capable of substantially conforming to the surface of the work against which they are projected, and an abradant, and means for delivering said abradant to said nozzles.

11. An apparatus of the class described comprising means for translating a plurality of workpieces in succession in a predetermined path, a plurality of nozzles spaced along said path to direct the discharge therefrom across the path

and into impinging blast engagement with the workpieces as they are successively translated through the discharges of the nozzles, a supply of abradant composition under blast pressure, the composition comprising a liquid vehicle, a multiplicity of small fragments of yieldable nonmetallic material capable of substantially conforming to the surface of the work against which they are projected, and an abradant, and means for delivering said abradant to said nozzles.

12. An apparatus of the class described comprising means for translating a plurality of workpieces in succession in a predetermined path, a plurality of nozzles spaced along said path and mounted for independent adjustment relative thereto to direct the discharge therefrom across the path and into impinging blank engagement with the workpieces as they are successively translated through the discharges of the nozzles, a supply of abradant composition under pressure of the order of 200 lbs., the composition comprising a liquid vehicle, a multiplicity of small fragments of yieldable nonmetallic material capable of substantially conforming to the surface of the work against which they are projected, and an abradant, and means for delivering said abradant to said nozzles.

13. An apparatus of the class described comprising a work holder, a nozzle directed for impinging discharge upon the work, said nozzle having a rubber orifice and an elongated transversely curved forwardly projecting rubber nose portion above the orifice and open on its underside, means for supplying the nozzle with an abradant comprising a liquid vehicle of cream-like consistency under blast pressure, a multiplicity of fragments of yieldable nonmetallic material of the order of one-fourth inch in diameter, and an abradant, the fragments comprising sponge rubber and felt in approximate proportions of one part of sponge rubber to three parts of felt.

14. An apparatus of the class described comprising a work holder, a nozzle directed for impinging discharge upon the work, said nozzle having a rubber orifice and an elongated transversely curved forwardly projecting rubber nose portion above the orifice and open on its underside, means for supplying the nozzle with an abradant comprising a liquid vehicle under blast pressure, a multiplicity of fragments of yieldable nonmetallic material, and an abradant.

15. An apparatus of the class described comprising means for translating work in a predetermined path, a supply of abradant material, means for discharging a blast of said abradant material upon the work as it is translated, said abradant material comprising a vehicle of cream-like consistency, a multiplicity of fragments of yieldable nonmetallic material, and a powdered abradant, the fragments comprising sponge rubber and felt.

16. An apparatus of the class described comprising means for translating work in a predetermined path, a supply of abradant material, means for discharging a blast of said abradant material upon the work as it is translated, said abradant material comprising a liquid vehicle, a multiplicity of fragments of yieldable nonmetallic material, and a powdered abradant.

17. An apparatus of the class described comprising work supporting means, a supply of abradant material, means for discharging a blast of said abradant material against the work, the abradant material comprising a liquid vehicle, a multiplicity of fragments of yieldable nonmetallic material capable of substantially conforming to the surface of the work against which they are projected, and a powdered abradant in such quantity that the fragments are substantially coated therewith as they are projected against the work.

HENRY J. VANDER WAL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,249,493	Raymond	Dec. 11, 1917
1,352,598	Hart	Sept. 14, 1920
1,588,763	Moulton	June 15, 1926
1,907,196	Aitken	May 2, 1933
1,907,411	Timoney	May 2, 1933
2,073,134	Schweitzer	Mar. 9, 1937
2,395,160	Anderson	Feb. 19, 1946
2,462,439	Eppler	Feb. 22, 1949