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Ferrara

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[54] **CENTRIFUGAL MEANS FOR DRYING AND APPLYING LIQUIDS TO ARTICLES**

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Related U.S. Application Data

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[52] **U.S. Cl.** **118/52,** 118/64

[51] **Int. Cl.** **B05c 5/00,** B05c 11/12

[58] **Field of Search** 118/52, 53, 54, 9, 64; 134/153; 233/14

[56] **References Cited**

UNITED STATES PATENTS

442,628	12/1890	Kristen	118/52
1,618,779	2/1927	Pleister	118/53 X
1,915,162	6/1933	Klaiber	134/153 X
2,226,360	12/1940	Spickelmier et al.	118/52 X
2,387,300	10/1945	Ronci	118/52
2,428,840	10/1947	Estes et al.	118/52
2,580,131	12/1951	Rowell	118/52 X

FOREIGN PATENTS OR APPLICATIONS

596,037	12/1947	Great Britain	118/52

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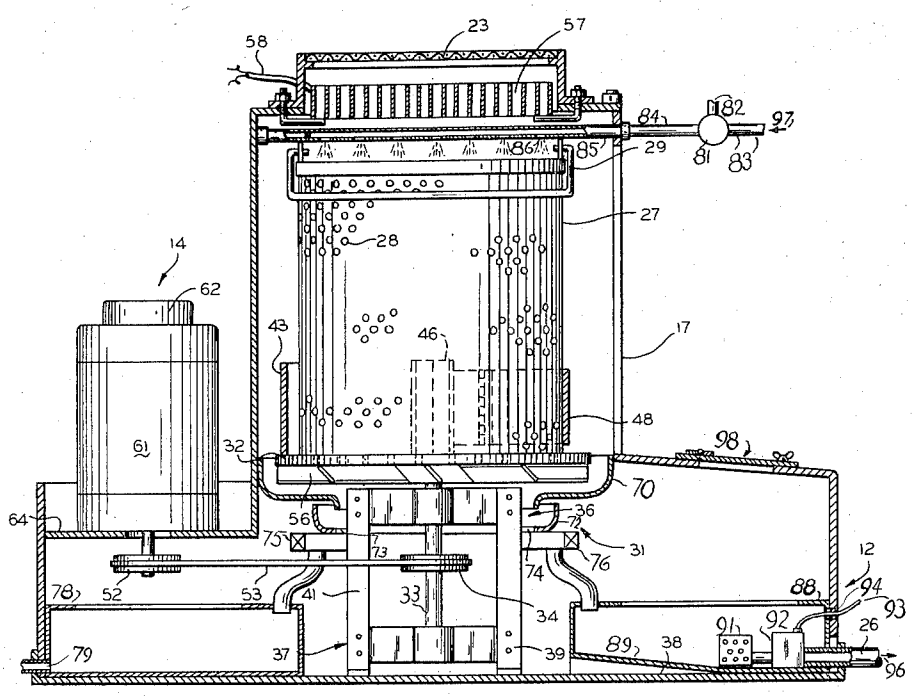
[57] **ABSTRACT**

A centrifugal dryer for drying small machine parts. The dryer features means such as an access door and a biased ramp leading thereto to facilitate the loading and unloading of a basket containing the parts into and out of the dryer. In addition, the drying process is expedited by utilization of heated air driven directly from a heater above the basket bearing the part through to the bottom of the work basket thereby minimizing duct work.

3 Claims, 4 Drawing Figures



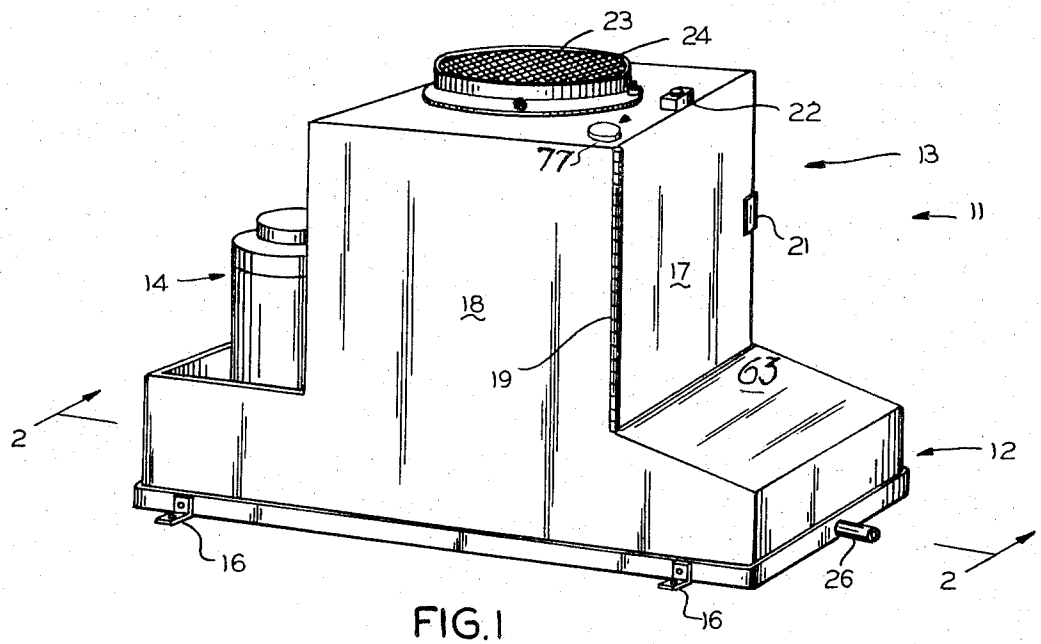


FIG. 1

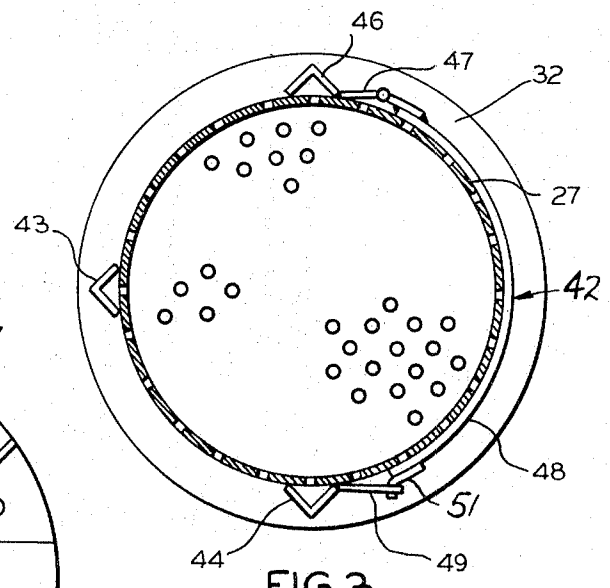


FIG. 3

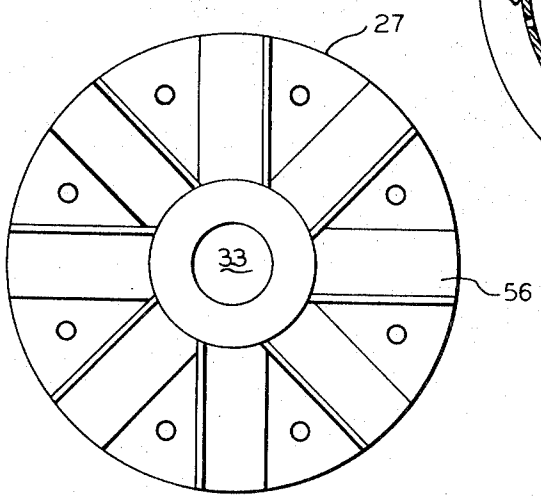
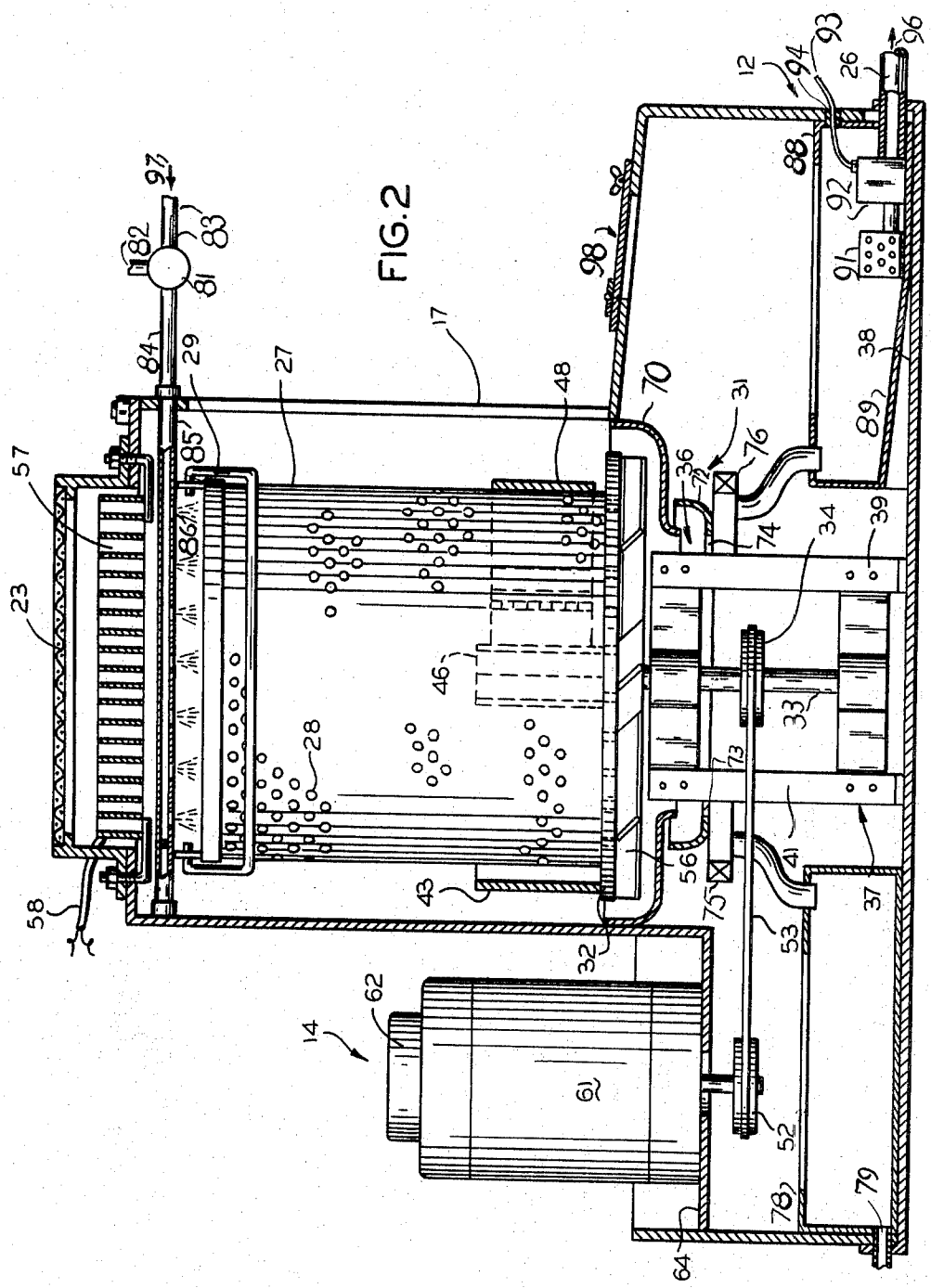


FIG. 4

FIG.2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CENTRIFUGAL MEANS FOR DRYING AND APPLYING LIQUIDS TO ARTICLES

This application is a division of Ser. No. 91,798, filed Nov. 23, 1970, now U.S. Pat. No. 3,688,906.

This invention relates to centrifugal dryers, and more particularly to such centrifugal dryers used for drying small machine parts after they are punched out on a press, or the like.

When such machine parts are received from the punch press, they are covered with fluids, such as cutting oil. Subsequent to being punched out, many times the parts are deburred. During the deburring process, the parts may be lubricated with water. Thus, whether deburred or not, the parts need to be dryed, otherwise, they will be adversely affected by the liquid covering on the parts. For example, the liquid covering the parts speeds the deterioration of the parts through oxidation. It is common therefore to dry the small machine parts after the machining.

Centrifugal dryers are used for the drying process. Presently, the parts are placed into work baskets which are loaded into top loading centrifugal dryers by lifting the heavy baskets.

Heating units are mounted in the covers of the centrifugal dryers and fans create a hot air current going through the basket when it is centrifugally driven to facilitate the drying process. The hot air and the fans are many times directed through relatively complicated duct work.

Mechanical brakes are generally used to stop the basket when the drying operation is completed. Thus, in present operations, it is necessary for the operator of the drying machine to laboriously lift a heavy basket loaded with dripping machine parts to the top of the machine and to mechanically operate a lever controlled brake to jog the basket in the centrifugal dryer to properly distribute the weight.

Accordingly, an object of the present invention is to provide new and unique centrifugal dryers for small machine parts.

A related object of the invention is to provide a centrifugal dryer having an access door on the side thereof to facilitate the unloading of the work basket into and out of the dryer.

Another object of the invention is to provide a centrifugal dryer arrangement utilizing a minimum of duct work for forcing heated air through the basket during the centrifuge operation.

A further object of the invention is to provide for automatically braking the rotation of the work basket responsive to the operation of the stop button removing drive power from the motor.

In accordance with one aspect of this invention, a centrifugal dryer is provided having an access door in one side thereof. The access door is hinge mounted to swing horizontally and provide wide openings for receiving a work basket loaded with small machine parts for drying. A biased ramp or platform leads into the access opening and further facilitates loading and unloading the machine.

Clamp means are provided for clamping the work basket into place on a platform of a spinner assembly. The motor for driving the spinner assembly is provided with an electrical brake system that responds to the off switch for further automatically braking the motor to accelerate the stopping process.

The top of the centrifugal dryer is provided with a screened opening through which air is drawn by a fan placed at the bottom of the spinner assembly. A heating unit is mounted beneath the screen top opening so that when the fan operates, hot air is pulled through the work basket thereby facilitating the drying of the work pieces within the basket. The location of the fan directly below the spinning assembly eliminates duct work.

A drain pan is provided at the bottom of the unit with a drain spigot attached thereto. Controls are conveniently mounted on an external portion of the centrifugal dryer. The door and clamping means are serially connected with the motor power so that the spinner cannot rotate unless the door is properly latched and the work basket is properly clamped in place.

The above and other objects and features of this invention together with the manner of obtaining them will become more apparent, and the invention itself will be best understood when making reference to the following description of a preferred embodiment of the invention taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a pictorial view of the inventive centrifugal dryer;

FIG. **2** is a sectional view taken on a plane coinciding with line **2—2** of FIG. **1**, looking in the direction of the arrows;

FIG. **3** is a top view of the spinner assembly of the inventive centrifugal dryer.

FIG. **4** is a view of the fan blades.

Turning now to the drawings, FIG. **1** shows an exemplary centrifugal dryer **11.** Centrifugal dryer **11** includes a base section **12** supporting an upraised working cabinet **13** and a motor brake-assembly **14.** Means such as anchor angles **14, 16** are provided for anchoring the centrifugal dryer **11** to the ground. The anchor angles are affixed to the frame of dryer **11** and bolted to the floor.

Means are provided for loading and unloading the centrifugal work section **13.** More particularly, access door **17** is shown coupled to front wall **18** of the work cabinet section through means such as hinge **19.** A latch **21** is provided for locking the door in a closed position. Interlocking switching means (not shown) are provided to assure that the motor assembly can not operate unless door **17** is properly latched.

Control switch means **22** are located for easy access to the operator of the machine. The switch means normally has a start and stop switch. The switch means may also be provided with a clockwise rotating switch, a counterclockwise rotating switch and a heater switch along with a jog switch, for example.

Means are provided for making the interior of work section **13** accessible to exterior air. More particularly, as shown, an opening **23** is provided that is covered by the screen **24.**

Means are provided for draining out excess fluid that may be derived from the stock parts being processed in the centrifugal dryer. More particularly, drain means **26** are provided at the bottom of base **12** reaching into the interior of the base for draining a pan or the like used for catching the excess moisture obtained from the processed stock material.

The remaining figures more clearly show the interior structure of the centrifugal dryer **11.** Means, such as work basket **27,** are provided for holding the stock ma-

terial or small parts being processed. Basket **27** is either fabricated from screening or from perforated sheets. Perforations are shown as an example, such as perforated hole **28.** The basket is further provided with handle means **29** to facilitate the transportion thereof.

To load the dryer, the basket is placed on the spinner assembly **31** through the doorway or access opening **17.** The spinning assembly **31** comprises platform **32.** A drive shaft **33** is fixedly coupled to platform **32** in any well known manner. A pulley wheel **34** is attached in any well known manner to the drive shaft **33.**

The spinner assembly **31** further includes means for reducing friction during the rotation of platform **32.** More particularly, bearing assemblies **36, 37** are provided. In one exemplary embodiment, the bearing assemblies were Timken bearing No. 362-A-368A and Timken bearing No. 214-14, 116, respectively. The bearing assembly **36** is shown as being supported above the bottom flooring **38** of base unit **12** through frame members **39** and **41,** while bearing assembly **37** is juxtaposed to the flooring **38.**

While the presently available centrifugal dryers included specialy designed basket holder assemblies, the spinner retains the baskets in place during the centrifugal spinning operation using much simpler means. More particularly, basket clamp means **42** are provided. The clamp means is perhaps best shown in FIG. **3** where an exemplary mode of holding the basket is shown. As shown therein, the angle irons **43, 44** and **46** are peripherally located to conform to the outer contour of the basket. The clamp means **42** are attached between angle irons **44** and **46** to lock the basket in place.

In greater detail, clamp means **42** includes a hinge **47** having one end thereof fixedly attached in any well known manner to one end of angle iron **46.** The other end of hinge **47** is fixedly attached to clamp member **48.** Clamp member **48** may be fabricated from a rigid material to conform to the circumference of the barrel or it may be fabricated from a material such as flexible sheet metal, or the like. A locking member **49** of clamp **42** is fixedly attached, in any well known manner, to angle iron **44.** A latch member **51** of clamp **42** is fixedly attached to member **48** and removably attached to locking member **49** for locking the barrel into place contiguous to the three angle irons.

Means are provided for coupling the pulley **34** to the motor brake assembly **14.** More particularly, the shaft of the motor has a pulley **52** attached thereto. A belt **53** attaches motor pulley **52** to platform pulley **34,** so that when the motor rotates, the platform is also caused to rotate at a desired number of revolutions per minute to provide a centrifugal action to be desired.

Means are provided for forcing air through the barrel as the barrel is rotated on the spinner to more effectively dry the piece parts in the centrifugal dryer. More particularly, fan means, such as fan blade **56** are attached to drive shaft **33** in any well known manner to rotate when the spinner assembly rotates. The blade configuration of the fan in an exemplary embodiment is best seen in FIG. **4.** As the barrel rotates, the fan pulls air through the screened opening **23** at the top of the work cabinet through the basket **27** and down past the fan and out through suitable openings in the base assembly **12.** No duct work is required, because the actual walls of the work cabinet enclose the basket sufficiently to provide a forceful draft through the basket responsive to the rotation of the basket and the fan.

Means, such as heater unit **57** are provided for heating the air as it passes through opening **23.** The heater unit **47** may be any well known type heater, such as commercially available Chromalox heaters KSEF **30.** Means, such as leads **58** are provided for attaching the heater **47** to a source of power through suitable switching devices, not shown.

The motor brake assembly **14** includes a motor **61** and an electrical brake **62.**

The assembly **14** is shown as mounted on a horizontal shoulder. On the opposite side of cabinet **13,** adjacent to access opening **17** is a biased shoulder **63.** The biasing facilitates the loading and unloading of the dryer.

In operation, the access door **17** is opened, and a work basket loaded with stock parts requiring drying is placed on the biased portion **63** of the base unit **12.** From the biased portion **63,** basket is slipped onto platform **32** and pushed against the angle irons **43, 44** and **46.** Latching device **42** is locked to entrap basket on the platform in a stable position. The door is then latched, and the operator then jogs the centrifugal dryer so as to evenly distribute the stock parts against the basket. Depending upon the size and shape of the stock parts, the operator will perform the required number of jogging operations. The jogging operations are either performed by pressing a job button or alternately pressing the start and stop buttons.

After the weight is evenly distributed, the operator then presses the start button and allows the centrifugal dryer to rotate for a sufficiently long time to dry the stock parts in the basket.

A drip tray **70** is positioned below the basket **27** and sealed at its periphery to the walls of housing **13.** Therefore, any fluid or other material flung out of the basket, responsive to its centrifugal motion, is caught on the walls of the housing **13.** As this material runs down the wall, it reaches the drip tray **70,** which guides it into a second hollow semi-toridal shaped, tray **72.** This tray **72** collects fluids which may drip out through openings **70, 72.**

There is an air passage opening in the center of the drip trays **70, 72** for admitting a draft of air forced through the basket by the fan **56.** The drainage holes in the bottom of the basket **27** are arranged so that the fluids in the basket **27** do not drip into this air passage.

The inside lip of the drip tray **74** (which is concealed from view by bearing **36**) preferably turns up so that fluids are trapped, to prevent their discharge at any place except through the drainage holes **73, 74.**

Means are provided for controlling and directing the flow of fluids out of the drip tray **72.** More particularly, each of the drainage holes **73, 74** has an associated valve **75, 76** which is electrically controlled by a suitable programming means, such as the programmed switch **77,** commonly used on automatic washers and driers. Thus, when the basket **27** is first placed in the dryer, the parts are wet with an ambient fluid, which may be either a cutting oil, as from a punch press operation, for example, or a washing fluid, as from a deburring tumbler operation. When the dryer first starts to spin, this ambient fluid is flung off and onto the walls of the cabinet **13.** The valve **75** is then open and the

valve **76** is closed. Drainage is from drip trays **70, 72** and into a catch pan **78** and out a hose **79.**

Means are provided for covering the parts with a filtered fluid; such as for example, an oil solution to prevent oxidation of the parts. In greater detail, after the original ambient fluid has been flung off the parts, a suitable valve **81** is operated to either of one or several positions according to the users design and needs. As here shown, this valve has two intakes **82, 83** which allow a selective introduction of either of two fluids. Of course, any suitable number of such intakes could be associated with this valve.

The outlet port **84** of the valve **81** is connected to a suitable manifold **85** having a plurality of spray holes or outlets, such as **86.** Thus, the fluid admitted through the valve showered down on top of the basket **27.**

In operation, the valves may be programmed to provide for showering the parts with a sequence of fluids. At this time, the program switch closes the drainage valve **75** and opens the drainage valve **76.** Thus, the fluid showering down, as at **86,** is flung out of the basket **27,** caught in drip trays **70, 72** and passed through valve **76** to a catch pan **88.** The floor **89** of the pan **88** is shaped to provide a sump area containing a filter **91** and motor **92.** The motor is driven by power supplied via an electrical cord **93** passing through a seal **94** in the wall of the dryer housing.

As the motor **92** runs, the fluid filtered at **91** passes out the tube **26** and into the inlet **83,** as indicated by the arrows **96, 97.** Thus, the filtered fluid is recycled any suitable number of times through the basket **27.**

A suitable access door **98** is put into the housing to enable the operator to change the filter **91,** as required. Symbolically, this door is here shown at **98;** however, it should be understood that convenience will dictate the actual door position. For example, it is desirable to keep the ramp **63** clear of all projections so that it may serve as a guide for placing the basket in the housing **13.** Thus, it is preferable to recess the door, provide guide rails raised above the door, or relocate the door to be in the side of the housing. In any event, door **98** may be opened periodically to service or replace the filter **91.**

Upon reflection, it should be clear that the described arrangement enables a complete programming of a drying cycle. The basket is placed in the cabinet and all ambient fluids are drained off via valves **75** and drain **79.** Thus, valves **75** is closed, **76** is opened, and **81** is rotated to admit a recycled fluid used during material processing. The sequence may be repeated in any suitable manner as different fluids are introduced via inlets **82** and **83** and flushed out the drain **79** followed by a recycling of filtered fluids, such as rust inhibitors, transmitted via valves **81, 92** and pipes **26, 83.** In some cases, the pipes **26** and **84** may be interconnected to eliminate the valve **81.**

The rotation of the spinner platform along with the fan pulls air through the screened opening where the air is heated and through the basket where the parts are centrifugally forced outwardly and thus severely agitated and exposed to the hot air rushing past them. When the drying is complete, the operator of the machine presses the stop button, which automatically brakes the motor to stop the rotation in a relatively short period of time.

The operator of the machine then unlatches the door **17,** uncouples the basket clamp and slides the basket down the biased shoulder **63** to either a waiting cart or transports it by carrying it by its handle **29** to the next station for operation, which may be a plating operation, for example. Thus, there is no necessity for the operator to physically lift the heavy buckets of stock parts, which may weigh upward to 75 pounds, and which may either be dripping wet or excessively hot after the operation of the centrifugal dryer.

It should be understood that while the fan is shown mounted directly below the basket, it may be removed further along the drive shaft. For example, it may be below bearing **36.**

While the principles of the invention have been described above in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of the invention.

I claim:

1. A centrifugal dryer for spinning machine parts at a high rotational velocity to remove ambient fluids and dry the machine parts,

said dryer comprising a base section,

said base section supporting a cabinet section rising from said base section,

access opening means in the side wall of said cabinet section for mounting and dismounting said basket on said spinner platform means,

a separate removable perforated basket means for holding said machine parts for transporting and for drying,

spinner platform means located within said cabinet for spinning said basket,

motor means mounted on said base section for supplying power necessary to spin said spinner platform means,

clamping means having locked and unlocked position for locking said basket to said spinner platform means when in the locked position and enabling horizontal movement of said basket when in the unlocked position, whereby said basket can be mounted and dismounted,

control means for selectively starting or stopping said motor means,

coupling means for coupling said motor to said spinner platform means,

means for selectively showering additive fluids on said parts while said spinner assembly is operating, and

said showering means comprising valve means for selectively directing a flow of additive fluids through said dryer.

2. The dryer of claim **1** wherein said valve comprises means for individually, selectively directing a flow of additive fluids from different sources through said basket.

3. A centrifugal dryer for spinning machine parts at a high rotational velocity to remove ambient fluids and dry the machine parts

said dryer comprising a base section,

supporting a cabinet section rising from said base section,

a separate removable perforated basket means for holding said machine parts for transporting and for drying,

spinner platform means located within said cabinet for spinning said basket,

motor means mounted on said base section for supplying power necessary to spin said spinner platform means,

clamping means for clamping said basket to said spinner platform means,

control means for selectively starting or stopping said motor means,

coupling means for coupling said motor to said spinner platform means,

access opening means in the side wall of said cabinet section for mounting and dismounting said basket on said spinner platform means,

means for selectively showering additive fluids on said parts while said spinner assembly is operating, and

said showering means comprising valve means for selectively directing a flow of additive fluids through said dryer, wherein said showering means comprises a drip tray for collecting said directed fluids and the ambient fluid,

filter pump means, and

drip tray valve means for selectively directing said directed fluids through said drip tray to said filter-pump means, and said basket means to return through said drip tray to said filter-pump means, and for selectively directing said ambient fluids to a separate drain.

* * * * *