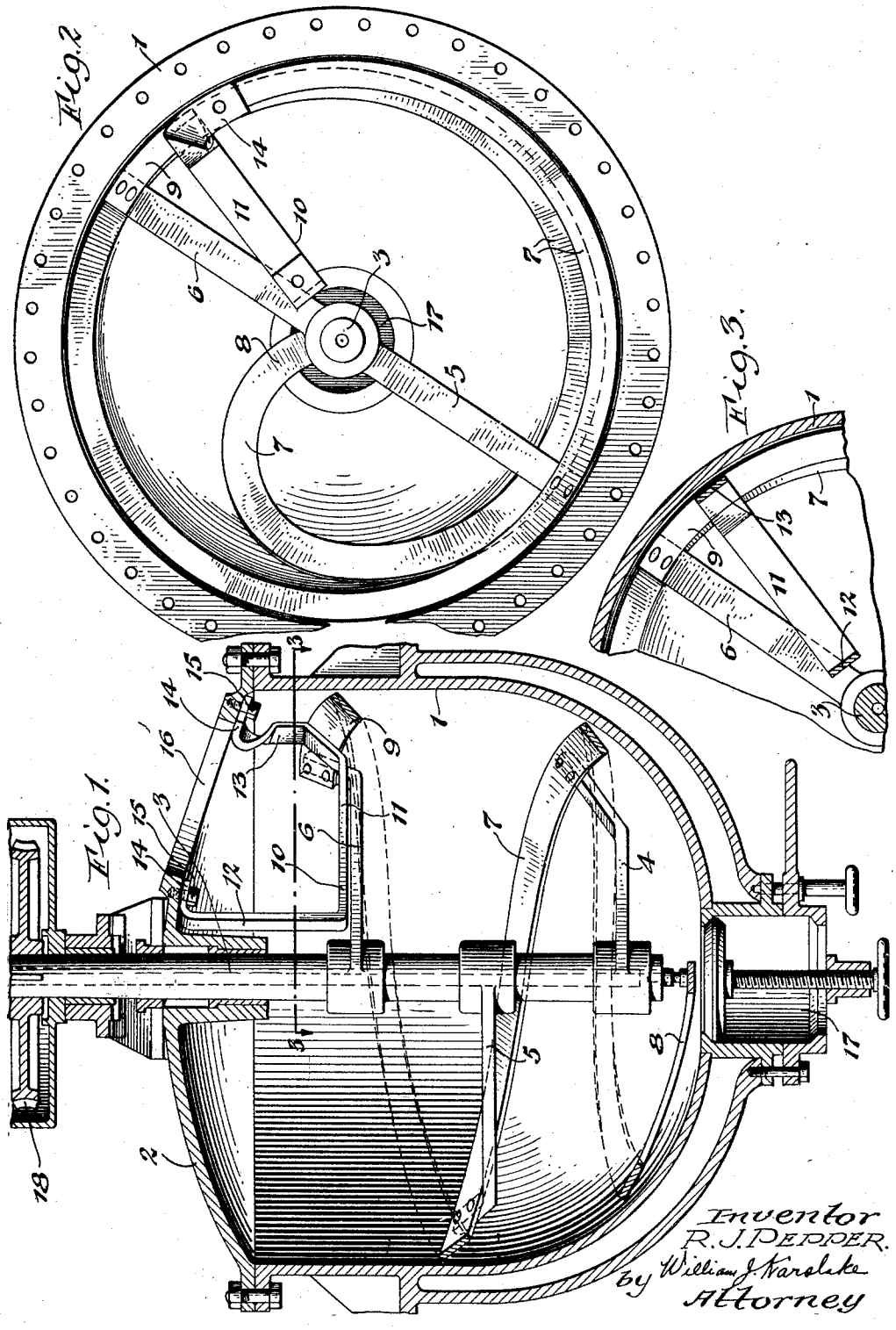
May 27, 1930. R. J. PEPPER 1,760,374

MATERIAL AGITATION

Filed Feb. 19, 1926



Patented May 27, 1930

1,760,374

# UNITED STATES PATENT OFFICE

RUSSELL J. PEPPER, OF KENMORE, NEW YORK, ASSIGNOR TO NATIONAL ANILINE & CHEMICAL CO., INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

## MATERIAL AGITATION

Application filed February 19, 1926. Serial No. 89,318.

This invention relates to a process and apparatus for performing operations, such as mixing, kneading, drying or the like upon materials, and particularly upon materials of a plastic nature, wherein agitation is utilized.

Materials in a pasty or viscous state do not lend themselves generally to the ordinary means of agitation, for it is found that they tend to rotate with the agitator, and eventually such portions that may be dislodged become packed out of the range of the agitator, as upon the cover and the upper walls of the container. Adequate agitation, however, requires that there be a relative movement within and throughout the mass under treatment; and it is furthermore desirable that separated portions be brought into contact to form a homogeneous mass.

It is an object of this invention to provide agitation suitable for materials including those of a plastic nature. A further object is an agitator construction that tumbles as well as causes relative movements within the mass being treated. These and other objects will hereinafter appear.

The invention briefly resides in elevating portions of the material being treated in contact with the container walls, which may be heated, and, by positive action causing portions at the upper limit to separate from the elevating means and return for a repetition of the cycle. A suitable apparatus for this purpose is a container provided with an agitator conforming to its walls and, in conjunction with the agitator, a breaker that shears or cuts elevated material free from the agitator and adjacent structure, so that the sheared-off portion falls back toward the bottom to merge with other portions.

In the accompanying drawing

Fig. 1 shows a section of a container with a suitable agitator and breaker;

Fig. 2 is a top view with the cover removed and

Fig. 3 is a section through the breaker.

A jacketed container 1, preferably of the round bottom type, has suspended from the cover 2 a vertical agitator shaft 3. From the shaft there extend spaced arms 4, 5, 6, the ends of which support a ribbon agitator 7. The lower end 8 of the ribbon is secured to the shaft and the upper end 9 terminates at its connection with the arm 6.

A breaker 10 is suspended preferably from the cover so that it is removed with the latter. The breaker is conveniently made of strap iron having a portion 11, conforming in outline to the upper arm 6 and the agitator portion carried thereby, and two vertical portions 12 and 13 contiguous to the shaft and the container wall respectively. These parts are preferably mounted to present a narrow edge, that is, the broad side is parallel to the adjacent structure. The breaker is suitably secured to the cover as by the integral ears 14 and screws 15.

The container has the usual charging opening 16 and a valve controlled discharge outlet 17. A drive mechanism 18 operates the agitator.

In the use of the apparatus, the container is charged with the material to be agitated, the container jacket being brought to the desired temperature. The agitator is then rotated to elevate material in contact with it. Portions at the upper end of the agitator are sheared from the agitator ribbon, the supporting arm, the adjacent shaft section and the wall and, as these are crowded off the breaker by the advance of other portions, they are left without any support. Consequently they fall into the vacant space created by the receding agitator, giving a decided tumbling action to the material.

It is thus apparent that the rotation of the agitator causes the peripheral portions of the charge, that is, those portions in the neighborhood of the walls of the vessel, to be elevated.

As one of the numerous applications for which the invention is adapted, that of drying a dye-stuff in the form of a press cake, obtained in the coupling of paranitraniline with H-acid and diazobenzene, and the filtering of the product, may be cited. Without the breaker, the cake has a tendency to pack upon the cover and the upper walls of the container, and the operation is a failure. The breaker, however, effectively corrects this condition, and a dried product, substan-

tially in a fine state of division, is produced with relative rapidity.

In operations where heat is used, it is preferable that the agitator conform closely to the container walls so that little or no deposit is left upon the walls to interfere with the transfer of heat. It is also preferable that the effective elevating portion of the agitator be limited to about one turn or convolution in order that material returned by the breaker may drop substantially to the bottom of the container.

I claim:

1. Apparatus for agitating material comprising in combination a container, substantially vertical agitating means within said container and adjacent the wall thereof, and means for removing material from said agitating means.

2. Apparatus for agitating material comprising in combination a container, means for spirally elevating material in the container, and means for removing material from said elevating means.

3. Apparatus for agitating material comprising in combination a container, a substantially vertical spiral agitator within the container, and a breaker mounted in said container cooperating with said agitator.

4. Apparatus for agitating material comprising in combination a container, a substantially vertical spiral ribbon agitator within said container, and a breaker mounted in said container in shearing relation with said agitator.

5. Apparatus for agitating material comprising in combination a container, a substantially vertical shaft axially suspended within the container, spaced arms extending from said shaft, a spiral ribbon agitator supported by said arms contiguous to the wall of the container, and a breaker suspended in said container and conforming to the upper of said spaced arms and the agitator portion carried thereby.

6. In an apparatus for agitating material, the combination with a container and a substantially vertical agitator of the ribbon type, of a breaker adapted to scrape material from the upper portion of said agitator.

7. Apparatus for agitating material comprising in combination a container, a cover for said container, a vertical shaft suspended from the cover and axially within the container, spaced arms extending from said shaft, a spiral ribbon agitator supported by said arms contiguous to the wall of the container, and a breaker suspended from said cover in said container and conforming to the upper of said spaced arms and the agitator portion carried thereby, said breaker being adapted to shear material from contact with the upper portion of said agitator and said upper spaced arm.

8. Apparatus for agitating material comprising in combination a container, a substantially vertical shaft axially suspended within said container, an arm extending from said shaft, a ribbon agitator supported by said arm, and a breaker adapted to shear material from said arm.

9. Apparatus for agitating material comprising in combination a container, a substantially vertical shaft axially suspended within said container, an arm extending from said shaft, a ribbon agitator supported by said arm, and a breaker suspended in said container conforming to and in spaced parallel relation to said arm.

10. Apparatus for agitating material comprising in combination a container, a substantially vertical shaft axially suspended within the container, spaced arms extending from said shaft, a spiral ribbon agitator supported by said arms contiguous to the wall of the container, and a breaker suspended in said container conforming to the upper of said spaced arms and the agitator portion carried thereby and in shearing relation with said arm and said agitator portion.

In testimony whereof I affix my signature.

RUSSELL J. PEPPER.