

UNITED STATES PATENT OFFICE

2,647,892

ANTIOFFSET POWDER AND PROCESS FOR
PREPARING SAME

Laurent J. La Brie, Rye, and James E. Fenn,
Oceanside, N. Y., assignors to Oxy-Dry Sprayer
Corporation, New York, N. Y., a corporation of
New York

No Drawing. Application July 11, 1950,
Serial No. 173,242

5 Claims. (Cl. 260—233.3)

1

The present invention relates to a novel and improved anti-offset powder and to an improved process of making such a powder.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the processes, steps and compositions pointed out in the appended claims.

The invention consists in the novel steps, constructions, processes, compositions and improvements herein shown and described.

The present invention has for its object the provision of a novel and improved process of making an anti-offset powder for use in printing, as well as the novel and improved powder. A further object is the provision of a process of improving the characteristics of starch powder used for this purpose. Still another object is the provision of an improved process of producing an anti-offset powder which has improved electrostatic properties, is non-toxic, does not collect in the interstices of a printing plate and can be economically produced. The invention further provides an anti-offset powder which operates satisfactorily under widely different conditions of humidity and temperature and which is readily wet by an oleaginous printing ink so that frequent stoppage and cleaning of the color printing plates is obviated.

The invention is especially directed to the provision of an improved powder which is suitable for use in the anti-offset process disclosed in the patents to Beregh No. 2,394,656 and No. 2,394,657. However, the anti-offset process of the present invention is of more general application and is found useful in preventing offset or smutting of letterpress and lithographic impressions in general.

Heretofore, anti-offset powder for use in the "Oxy-Dry" or Beregh process has comprised special grades of natural starches, and these have proved to be generally satisfactory in printing single colors, in normal weather. However, when printing in two or more colors, the powder applied to the sheet after the first impression tends to collect on the printing plate for the second (or subsequent) impression and finally fills the interstices of the plate so that cleaning of the plate and removal of the powder collected thereon becomes necessary. Also, in humid weather, lumping of the starch powder sometimes occurs and interferes with the proper distribution or feed of the powder.

It has been proposed to use various substances

2

other than starch for the powder, but each of these has its own objections, as do the various mechanical mixtures of starch with talc or other inorganic powders which have been tried.

The present invention provides a starch product which does not lump, can be easily and uniformly fed from the Beregh or "Oxy-Dry" anti-offset apparatus in dry and in humid weather at all operating temperatures, which is readily wet by the ink so that it does not collect on a printing plate but is continually removed therefrom as the press operates, does not dull or impair the color of the printed impression, is non-toxic and otherwise not deleterious to health, is relatively inexpensive, and can be economically manufactured.

In accordance with the present invention the starch product comprises one of the starches having relatively large particles each of which is substantially covered with a film of a waterproof, low-viscosity, thermosetting resin, the film serving to improve the electrical characteristics of the starch particles at the same time rendering them oleophilic, non-coherent and less likely to lump together. Such a powder is prepared according to the process of the present invention by spraying a mass of the starch powder with a low viscosity, silicone resin, which may be diluted and to which may be added a catalyst to accelerate its thermosetting reaction, after which the starch is thoroughly mixed to spread the resin. The coated starch is then heated to dry it and to set the resin to its final thermoset form. Thereafter, a non-caking agent is added and the mixed product may be bolted, leaving on each of the starch particles an extremely minute film of waterproof, thermoset silicone resin which is no longer water soluble nor hygroscopic and improves the electrostatic properties of the particles as well as renders the particles oleophilic, non-coherent and free flowing.

It will be understood that the foregoing general description and the following detailed description as well are exemplary and explanatory of the invention but are not restrictive thereof.

Preferably, and more in detail, the starch product of the present invention is prepared from one of the starches having larger particles, such as arrowroot, potato or sago or a mixture of them, and less preferably from the starches having smaller particles, such as corn, tapioca, rice and wheat.

An edible, clean grade of starch is placed in an agitating drum and vigorously stirred, as by mechanical mixers and air currents, and is sprayed with a small amount of a low-viscosity,

liquid, thermosetting, silicone resin which, by heat treatment over a prolonged period, may be set to form a solid, waterproof, insoluble film over the particles of starch on which it is coated. Such silicone resins as are useful are those having a viscosity at 25° C. of from 10 to 40 centistokes with an acid value less than 0.2 and which are rapidly polymerized particularly when used with a catalyst.

The silicone resins are preferably selected from the liquid, mixed linear polysiloxanes such as are disclosed in the prior patent to Pantode 2,469,888 granted May 10, 1949, and most preferably the liquid, linear methylpolysiloxanes disclosed in the patent to Wilcock 2,491,843 of December 20, 1949. Such a material as presently marketed by Dow Corning Corporation, and identified as silicone resin "DC-1107," is highly satisfactory when used in relatively small amounts set forth below.

The use of a catalyst to accelerate the transformation of the thermosetting resin is highly desirable, as the catalyst not only reduces the time required for the heat treatment of the coated starch, but also reduces the discoloration of the starch inasmuch as the heat-treatment may be carried out for a shorter time or at a lower temperature, or both. Among the catalysts which are suitable are the conventional catalysts for the silicone resins, which include the salts of the heavier metals, such as a zinc or other heavy metal soap of a higher alkyl acid, such as the zinc salt of octanoic or caprylic acid. As usually used, the zinc soap is a liquid containing about 8% metal having a total solids content of 38% and an acid value of 15 with a viscosity of A (Gardner-Holdt).

Where desired, suitable solvents may be used to dilute the liquid to be sprayed, although only small amounts of such solvents are needed when a catalyst is employed and, if no catalyst is used, no solvent is required, although it may be useful. Such solvents are volatile liquids of low viscosity which are inert with respect to the silicone resin and the catalyst and among the many such solvents which may be used are petroleum distillates, such as naphtha and ether, the chlorinated hydrocarbons, such as carbon tetrachloride or ethylene dichloride.

Liquid treating compositions, suitable for the treatment of 1000 pound batches of starch in accordance with the present invention comprise:

Low - viscosity, thermosetting liquid silicone resin which can be reacted to form a waterproof insoluble film	5 oz. to 25 oz.
Catalyst (if used, about 1.4% to about 3% on the weight of resin)	0.07 oz. to 0.75 oz.
Solvent (if used, generally about 50% to 150% on the weight of resin)	2.5 oz. to 37 oz.

A specific formula which has proved to be very efficient in the production of a waterproof starch of white color which is readily dispersed by the Beregh or "Oxy-Dry" process, and has excellent electrical characteristics may be prepared according to the following formula:

Corn starch or tapioca starch--pounds--	1000
Low-viscosity thermosetting silicone resin, such as Dow - Corning "D - C 1107"	oz. av--

Catalyst, such as "Zinc Octasol"--oz. av-- 0.24
Catalyst solvent, petroleum naphtha

oz. av-- 3.5

Diluent, such as carbon tetrachloride if required by the atomizer ----oz. av-- 16 to 24

The ingredients are mixed, being completely soluble in the solvent and diluent and are then sprayed or atomized as an extremely fine spray into the vigorously agitated mass of starch. The agitation is continued until the resin and catalyst have been uniformly distributed over the particles of the starch so that each of the starch particles is substantially completely coated with the resin.

The resin-coated starch is then placed in a roaster and agitation is continued while the treated starch mass is heated at a temperature of from 200° to 250° F. for a period of 1 hour, more or less, preferably accompanied by blowing of hot dry air (at 150° to about 220° F.) through the mass of starch until the original moisture content of the starch and the solvent and diluent have been largely removed, or until the resin is fully reacted to form the heat-set, insoluble form of the resin.

The treated starch is then bolted through 100 mesh silk or wire cloth and may then be packaged, and is ready for use.

Where the finer starches are used, more resin is required due to the larger surface area of the particles, and with coarse starches, such as potato starch or arrowroot starch having a particle size of from 40 to 50 mu the formula given above may be used to treat about 1500 pounds of starch, rather than the 1000 pounds of corn or tapioca starch having a particle size of about 15 mu.

Where the sprayer is capable of producing a sufficiently fine spray, or where the mixing may be continued for a longer period of time, the diluent may be omitted, if desired, and where prolonged heating or heating at a higher temperature is not objectionable, the catalyst and solvent may be omitted. Thus, in many cases, it is possible to treat 1000 pounds of starch with from 5 to 25 oz. av. of the silicone resin, although the preferable quantity of resin is from 10 to 15 oz. av.

The free flowing properties of the resin treated starch are improved by the addition to it of small quantities of a desiccating, free-flowing agent, such as magnesium carbonate or preferably tri-calcium phosphate, and for this purpose from 0.05% to 0.1% of the finely powdered, free-flowing agent is added to the resin-treated starch after the heat treatment. The starch and desiccating, free flowing agent are thoroughly mixed and then bolted.

The starch as first subjected to the spray of silicone resin usually has a moisture content of from 10 to 18%, but if it is drier, less time is usually required for completion of the thermosetting reaction of the silicone resin. After the thermosetting reaction has been completed by heat-treatment, the treated starch product usually has a moisture content of less than 1 or 2%.

In appearance, the starch product of the present invention closely resembles the starch from which it was made, but with the exception that the treated starch is free-flowing, does not tend to lump together, is substantially waterproof and quite oleophilic, and has improved electrical properties so that it more readily acquires and holds an electric charge on its particles thereby

5

improving the dispersion of the starch particles as they are electrically charged and fed for deposition on a freshly printed sheet or web of paper.

The invention in its broader aspects is not limited to the specific process, steps and compositions described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

1. A free-flowing starch product, suitable for use in anti-offset processes and comprising dry starch particles coated with about 0.03% to about 0.15% of a thermoset polymethylsiloxane resin distributed over the surfaces of the starch particles.

2. The product set forth in claim 1 wherein the product additionally comprises from about 0.05% to 0.10% of a non-caking inorganic salt selected from the group consisting of magnesium carbonate and tricalcium phosphate.

3. A free-flowing starch product, suitable for use in anti-offset processes and comprising dry starch particles coated with about 0.06% to about 0.10% of a thermoset polymethylsiloxane resin distributed over the surfaces of the starch particles.

4. The product set forth in claim 3 wherein the product additionally comprises from about 0.05%

6

to 0.10% of a non-caking inorganic salt selected from the group consisting of magnesium carbonate and tricalcium phosphate.

5. A process of preparing a starch product which comprises treating starch particles with from about 0.03% to about 0.15% of a low viscosity thermosetting polymethylsiloxane resin dissolved in an inert, low-viscosity solvent containing a metallic salt catalyst amounting to about 1.4% to 3% by weight of said resin, distributing said resin solution on the starch particles, insolubilizing the resin by prolonged heating, distributing a non-caking agent selected from the group consisting of magnesium carbonate and tricalcium phosphate on said coated particles and bolting said coated, heat treated particles.

LAURENT J. LA BRIE.
JAMES E. FENN.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,030,461	Moss	Feb. 11, 1936
2,424,853	Safford	July 29, 1947
2,449,572	Welsh	Sept. 21, 1948
2,474,704	Thayer	June 28, 1949
2,500,770	Pierce	Mar. 14, 1950