UNITED STATES PATENT OFFICE.

CONRAD SEMPER, OF PHILADELPHIA, PENNSYLVANIA.

PROCESS OF MAKING POROUS ALUM.

SPECIFICATION forming part of Letters Patent No. 345,605, dated July 13, 1886.

Application filed July 22, 1885. Serial No. 172,290. (No specimens.)

To all whom it may concern:

Be it known that I, CONRAD SEMPER, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in the Manufacture of a Sizing Compound for Paper-Makers' Use, of which the following is a specification.

The object of my invention is to produce, from ordinary aluminous materials containing iron, a white porous sizing compound, and so neutral that it will not have a destructive influence upon the coloring materials generally employed in paper-making—such, for instance, as ultramarine-blue. The raw aluminous material used is or is not calcined, according to its nature. The powdered material, after calcination, if calcination be found necessary, is mixed with sulphuric acid. The sulphuric acid may, in some cases, be employed in a cold state; but in most cases it will be more advantageous to heat the same. A violent reaction will soon ensue, and it will sometimes be found necessary to add small quantities of water, or weak liquors from a previous operation, to prevent an overflow. When the mass is in ebullition and the process nearly terminated, a sufficient quantity of metallic zinc is gradually added and is readily dissolved. Hydrogen gas is evolved, and peroxide of iron present is converted into protoxide of iron. It is advantageous to use the zinc in a finely-divided condition, to insure a perfect reaction, and I have found that the article known as zinc-dust may be employed with good results, although other forms of zinc may be employed. If it should be desired to add the zinc to the mass after it has been diluted with a sufficient amount of water or weak liquor from previous operations, this course may be followed; but I prefer to add it to the mass before the solution has been diluted, and at about the time the violent action has ceased and while the mass is still hot and in a liquid or semi-liquid form. After the action has terminated, the mass is reduced to such a degree of concentration that it will not harden when cold. The liquor is drawn into suitable receptacles in which the impurities can subside, or the silica, undecomposed raw material, particles of carbon, or other insoluble material which are present may be removed by filtration or by other suitable means. The clear solution, which consists, chiefly, of sulphate of alumina, protosulphate of iron, and sulphate of zinc, is placed in evaporating-tanks and concentrated to such a density that it will solidify when cold. I prefer to concentrate it to from 60° to 65° Baumé, (more or less). After this strength has been reached the mass is left to cool sufficiently to become semi-fluid or viscid. At this point, and while it is still hot, a sufficient quantity, say two to three pounds of bicarbonate of soda to one thousand pounds of finished product, is added and stirred briskly into the mass. Carbonic acid will be freed and will be retained by and within the body of the semi-fluid mass. The mass is now removed or dumped into proper receptacles, where it will quickly congeal, upon which it can be broken up into lumps or fragments of the required sizes, and thus be quickly brought into a merchantable condition in which it will be easily soluble in water.

Letters Patent No. 243,635 have been granted me for a process in which the reduction of iron is obtained by means of finely-divided zinc; but the product of said process is obtained in a condition which requires considerable time and handling to bring it into a desirable merchantable state. I prefer to use, but do not confine myself to the use of, metallic zinc to effect the reduction of iron as above described. I can as well use any of the other well-known reducing agents and thereby obtain similar results. I do not confine myself to the use of bicarbonate of soda, as any other material or agent which will produce a porous condition of the mass may be employed.

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

1. The process described of manufacturing a porous material for paper-makers' use, containing sulphate of alumina, sulphate of zinc, and ferrous sulphate, substantially as set forth.

2. The process described of producing directly from any aluminous substance containing iron a white porous sizing material for paper-makers' use containing both zinc and iron, substantially as set forth.

3. The process herein described of producing directly from any aluminous substance

containing iron a white porous sizing material for paper-makers' use, which process consists, essentially, in treating a ferruginous solution of sulphate of alumina with zinc to reduce ferric oxide to ferrous oxide, then removing the insoluble matter from the said solution and treating the clear liquor in a sufficiently cool and concentrated condition with bicarbonate of soda to produce a porous structure, and finally crushing the mass into lumps of the desired size.

In testimony whereof I have hereunto signed my name this 17th day of July, A. D. 1885.

CONRAD SEMPER.

In presence of—
WM. C. STRAWBRIDGE,
J. BONSALL TAYLOR.