UNITED STATES PATENT OFFICE.

JOSEPH HAY AMIES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-THIRD TO CHARLES FREMONT TAYLOR, OF SAME PLACE.

COMBINED PAPER-PULP AND CEMENT PAVEMENT.

SPECIFICATION forming part of Letters Patent No. 622,877, dated April 11, 1899.

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To all whom it may concern:

Be it known that I, JOSEPH HAY AMIES, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented new and useful Improvements in a Combined Paper-Pulp and Cement Pavement, of which the following is a specification.

The object of my invention is to construct a pavement out of materials not heretofore used in combination for this purpose and which have every qualification called for in street service, such as durability, elasticity, good finish, and cheapness.

The process of manufacturing such a pavement consists of the steps or stages particularly described in the following, namely:

First, I take waste paper of all kinds and descriptions—such as old newspapers, cardboard, scraps, and the like, of which an abundance may be had for the mere cost of collection—and I place them in a mixed and unsorted condition into a vat containing a sufficient quantity of water and steam or boil them until they are perfectly soft and reduced to a pulp.

I wish it to be understood that by the use of the word "pulp" throughout this specification I mean paper and paper-scrap which has been softened by the treatment to which I subject it, as herein described, and thereby reduced to a plastic mass which retains in itself the character, strength, and fiber of the paper. I do not comminute or break up into small particles the said paper by the treatment I give it; but I render it soft and pliable without destroying the fiber. My object is to preserve the paper as paper throughout the stages of the manufacture as far as possible. Herein lies the difference between "wood-pulp" and "paper-pulp," as I use the term.

That the character of my pulp may be understood I will have to briefly explain the process of paper-making. Common paper is now mainly or entirely made from ground wood, (very small amount of rags, or what is called "hard stock," now being used.) With this wood-pulp the paper-maker mixes a certain amount of resin, which strengthens the wood-pulp and gives the paper made therefrom, as it passes through his machine and under his calenders, a hard surface which will hold ink to its surface. (Blotting-paper contains no such resinous mixture.) The resin used by the paper-maker is made as follows: He melts his resin with steam or other heat and then runs it into a lye made of soda-ash. This forms a soap. The soap is poured into the soft wood-pulp just before it is emptied from the beating-engine into a receiving-vat. This resin will not unite with the water in the vat, but clings to the wood-pulp. When I soften the paper-scrap in the manner above described, the resin in said paper resumes its viscid character. If I find there is not a sufficient quantity of the said resin in my pulp, I make and add to it what is needed to bring it into the proper condition for my further steps.

My second stage is as follows: Having so obtained my pulp I spread or open it by beaters, mingling therewith dry powdered clay of the character used in making bricks until I get the consistency required. This I know by the mixture balling or rolling into lumps. When this occurs, I have sufficient clay. The clay is viscid and will harden and become firm in its association with the said pulp. I mix the clay with the said pulp while it is hot and damp in the boiling-vat. While it is still hot and damp I remove it and place it in molds of the desired size. When I use said pulp without mingling clay therewith, I secure a solid formation, owing to the presence of the resinous mixture.

In the third stage of the process in addition to preparing the paper and paper-pulp as above described I beat or brush it out finely. I do not mingle clay with this pulp, but take it from the vat and dry it thoroughly. I then place it in a proper vessel where a quantity of oil is mingled with it. I then add crushed lime or other rock, sand, or gravel in suitable proportions until a rather stiff consistency is obtained; or this mixture may be formed as asphalt pavement is formed—that is, the sand and asphalt made very hot and the dried pulp warm and these united in suitable quantities in a mixture, into which the

oil in a highly-heated state may be poured and thoroughly mingled therewith. This mixture in a hot state is then placed in the mold on top of that already placed therein. The effect of these two mixtures coming together in the said mold under pressure is that the first mixture of pulp and clay is dried on its face and it adheres to and becomes perfectly united with the second mixture and a solid block is formed. Upon the face of the contents of said mold I now bring down a plunger with sufficient power to firmly set and concrete all the mass firmly together. The paving-block is then complete and after being seasoned or sun-dried is ready for use.

The proportions of the pulp and clay in the first mixture may be varied to secure different degrees of elasticity or rigidity, as desired. Paper or paper-pulp being a non-conductor of heat or cold will permit the use of a larger proportion of oils in combination with asphalt than is now possible, and on this account a much greater percentage of asphalt may be used in combination with my said ingredients than with any other materials, with the result of a longer life being given to the asphalt pavement so made than is now obtainable by any present method. I am informed that only about five to seven per cent. of oil can be used in mixing asphalt-pavement compositions, because if a higher percentage is used they will break down in the heat of summer; but because of this small percentage of oil the said pavements become so hard in winter as to crack off and granulate. Asphalt people admit if they could use twenty per cent. of oils instead of five or seven per cent. they could put down pavements that would last ten years without repairing. This larger percentage of oil I secure through using the materials herein named, and in addition the pulp adds strength and endurance to the composition.

My pavement has a surface that prevents slipping, and it is also noiseless and practically dustless.

I may lay this pavement down on the street in sheets instead of in blocks, as above described, and when I do I put the base of pulp and clay down upon a properly-prepared foundation in a hot state and roll it even and hard. I then lay thereupon the second-described layer of dry pulp, oil, sand, asphalt, or the like, also hot, and roll them by heavy steam-roller until they become united and set and at the same time very hard upon the face. Such a pavement may be put upon steep hills and inclines, and heavily-loaded teams may be drawn up and down these grades with ease, owing to the friction secured by the presence of the pulp and the firm foothold it affords to the horses.

I am aware that the use of paper in the construction of floors and other articles is not new; also, that paper-pulp has been used in compositions of various kinds and for many purposes, and I consequently do not wish to claim the use of paper and paper-pulp broadly; but,

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

1. A street-paving block consisting of two layers compressed together, the lower layer composed of a mixture of paper-pulp, resin and clay, and the upper layer consisting of paper-pulp, oil, and gritty material substantially as set forth.

2. A street-paving block consisting of paper-pulp in two layers adhering to form one integral piece, the lower layer containing clay and the upper layer ground rock or other gritty material substantially as set forth.

JOSEPH HAY AMIES.

Witnesses:
CLEMENT CRESSON,
JOS. W. ROBERTSON.