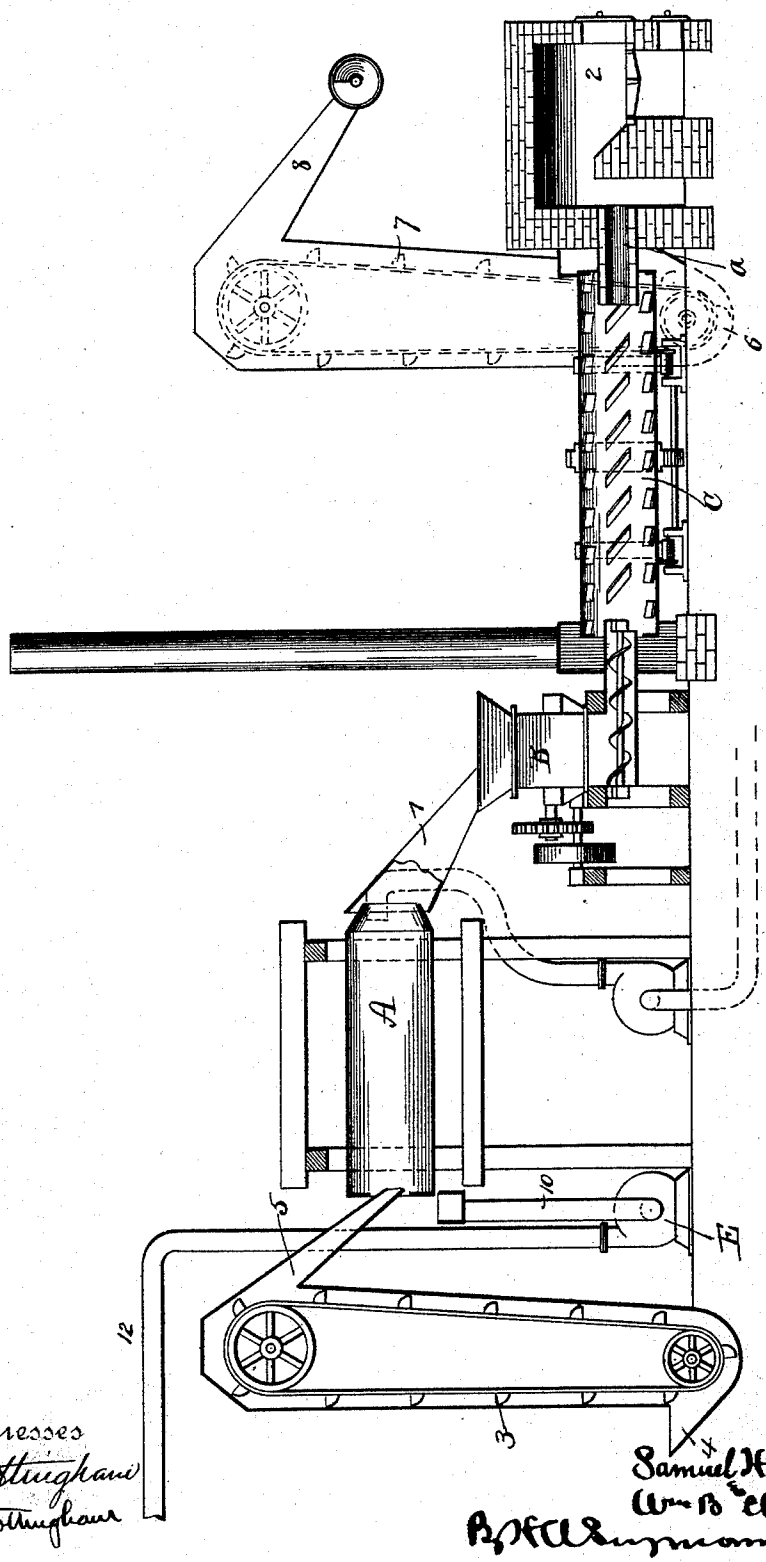
(No Model.)

S. HUGHES & W. B. CHISOLM.

APPARATUS FOR TREATING PHOSPHATE ROCK.

No. 483,452. Patented Sept. 27, 1892.



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UNITED STATES PATENT OFFICE.

SAMUEL HUGHES AND WILLIAM B. CHISOLM, OF CHARLESTON, SOUTH CAROLINA.

APPARATUS FOR TREATING PHOSPHATE ROCK.

SPECIFICATION forming part of Letters Patent No. 483,452, dated September 27, 1892.

Application filed April 4, 1891. Serial No. 387,684. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL HUGHES and WILLIAM B. CHISOLM, of Charleston, in the county of Charleston and State of South Carolina, have invented certain new and useful Improvements in Apparatus for Treating Phosphate Rock; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to an improvement in apparatus for the treating of phosphate rock, the object being to provide for a continuous treatment of the rock by a single process and passage through the machine.

A further object is to reduce the parts to a minimum and to reduce time and labor and produce superior results generally.

With these ends in view our invention consists in certain novel combinations of parts, which will be hereinafter described, and pointed out in the claims.

The accompanying drawing is a view in side elevation, partly in section, showing an improved apparatus for carrying out our process.

A represents a washer. This may be of any variety desired.

B is a crusher into which the rock is conducted by a chute 1 or other means from the washer, and C is a drier receiving heat from a furnace 2, located at one end thereof, through a pipe *a*, which directs the heat toward the center of the drier, from which point it extends and fills the drier. There are certain kinds of phosphate rock—such as the pebble rock—which require no crushing, as it is sufficiently fine without. When this rock is under treatment, the crusher is not used and the rock is discharged directly from the washer into the drier. We do not care to be restricted to the use of any particular washer or drier, or crusher when one is necessary, and as those shown are simply one variety of many more that could be used we have not regarded it necessary to go into the details of construction. Other accessories are also desirable, if not necessary, to complete the process and to effect the greatest possible saving of labor. For instance, instead of elevating the rock by hand and dumping it into the washer, we generally prefer to employ an elevator-belt 3, as shown. The material is then thrown into a chute 4 from cars, wheelbarrows, shovels, or the like and immediately carried upward until the buckets start to descend, when they discharge their contents into an inclining spout 5, which conducts it into one end of the washer. In a similar way after the material has undergone the complete process of treatment it is discharged into a hopper 6 and removed by the elevator-belt 7 and discharged through a spout 8 over a right and left conveyer-screw and conducted off, or a screw may be provided to take it directly from the hopper; also, we propose to remove the débris by means of a suitable pump E, arranged for the purpose. The water and débris draining from the washer enters this pump through a pipe 10 and is pumped off through a discharge-pipe 12 to any convenient place.

In carrying out our process the phosphate rock or other phosphatic material is thrown into the washer in any convenient manner. While here it is thoroughly agitated and scrubbed until all the foreign matter is removed, provision being made for a constant flow of water through the washer, so that the débris is not allowed to remain. Thence the rock passes into a crusher, if it requires crushing, or directly into a drier if no crushing is necessary, where it is rolled and tossed about in direct contact with a highly-heated blast of air from the furnace. By the time it has found its way through this drier it is thoroughly dried. It is then conducted off in any approved manner—as, for instance, as shown and described.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a washer so constructed and arranged that it will receive the material to be washed and the washing material, of a drier forming the body of a furnace, the heating portion being located at one end and the flue at the opposite end, said drier adapted to conduct the material from one end to the other in direct contact with the drying-blast, substantially as set forth.

2. The combination, with a washer, means for supplying water thereto, and a pump into

which the water and débris are emptied, of a drier into which the washed material is fed in direct contact with a drying-blast, substantially as set forth.

3. The combination, with a washer so constructed and arranged that it will receive the material to be washed and the washing material, of a crusher into which the washed material is discharged and a drier forming the body of a furnace, the heating portion being located at one end and the flue at the opposite end, this drier adapted to conduct material from one end to the other in direct contact with the drying-blast, substantially as set forth.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

SAMUEL HUGHES.
WILLIAM B. CHISOLM.

Witnesses:
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