UNITED STATES PATENT OFFICE.

CARL RENSING, OF BERLIN, GERMANY.

PROCESS OF HARDENING ARTIFICIAL STONE OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 681,580, dated August 27, 1901.

Application filed November 1, 1900. Serial No. 35,179. (No specimens.)

To all whom it may concern:

Be it known that I, CARL RENSING, a subject of the Emperor of Germany, residing at Lichtenberg, near Berlin, in the German Empire, have invented new and useful Improvements in Processes of Hardening Artificial Stone or the Like, of which the following is a specification.

For hardening calcareous sandstones it has heretofore been usual to introduce the bricks into a boiler, so-called "hardening-boiler," and to subject them for some time to a certain steam-pressure. The generation of the steam was effected in a separate boiler. A similar process is gone through in other chemical technical operations in which certain chemical transformations are effected by pressure and heat. Steam-pressure and heat are absolutely necessary for effecting a technical result such as hardening or chemical decomposition. The generation of pressure by steam alone is, however, too costly, as very large quantities of steam must be supplied for filling the hardening-boiler. The steam-generator is also from time to time strained or overworked and this gives rise to great consumption of fuel and considerable loss. Furthermore, the steam is very moist, because it is suddenly removed from the generator, so that considerable condensation takes place, particularly as the temperature and the pressure in the hardening vessel are naturally very low at the commencement of the operation. The steam is spent in heating the lining of the vessel, so that its pressure gradually decreases until the desired temperature in the hardening vessel is attained.

Now it is the object of this invention to obviate these disadvantages and to have the hardening vessel under the requisite pressure as soon as possible after the commencement of the operation. To this end I force into the operating vessel cold or heated air or any other suitable neutral gas—such, for example, as nitrogen, oxygen, or hydrogen—until the said vessel is brought under a high pressure, which is approximately that under which the operation is to be effected. The steam is then allowed to flow into the hardening vessel, which is filled with the pressure air or gas. If the operation is to be effected, for example, under a pressure of about seven atmospheres, the air, which may be heated or merely purified, is forced into the operating vessel until a pressure of, say, six atmospheres is attained, after which steam at seven atmospheres is allowed to flow in. There is then a pressure in the hardening vessel of about seven atmospheres, which is what is required for the operation. The steam in this case does not constitute the whole of the contents of the vessel, but it mingles with the medium—the air—although it still fulfils the functions necessary for the operation. Steam mixed in this manner with air possesses the advantage that comparatively little water is condensed from it, because there is quantitatively very little present, and the internal pressure in the operating vessel is not diminished by water condensation, as would be the case with a vessel filled with steam alone. In addition to this the steam which is in suspension in the medium—that is to say, the air, for example—suffers less condensation, as air is a worse conductor of heat than water-vapor.

It will be obvious that the invention will not be altered if steam be filled into the vessel before the air, this being advantageous on the ground of economy where waste steam is obtainable.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The herein-described process of hardening artificial stone, which consists in subjecting the articles to be treated, while inclosed, to the action of air and steam combined under high pressure, whereby economy of steam is effected and undue condensation of the steam is prevented, substantially as described.

2. The herein-described process of hardening artificial stone and the like which consists in subjecting the articles to be treated, while inclosed, to the action of a neutral gas at high pressure and then admitting steam at still higher pressure, to commingle with said neutral gas.

3. The herein-described process of hardening artificial stone and the like, which consists in subjecting the articles to be treated to the action of compressed air at substantially six atmospheres and admitting steam at a pressure greater than six atmospheres.

CARL RENSING.

Witnesses:
ROBERT BORNCMANN,
THEODOR SCHMUTZ.