

## CEMENT TREATING PROCESS.

**988,724.**

Fig. 1.

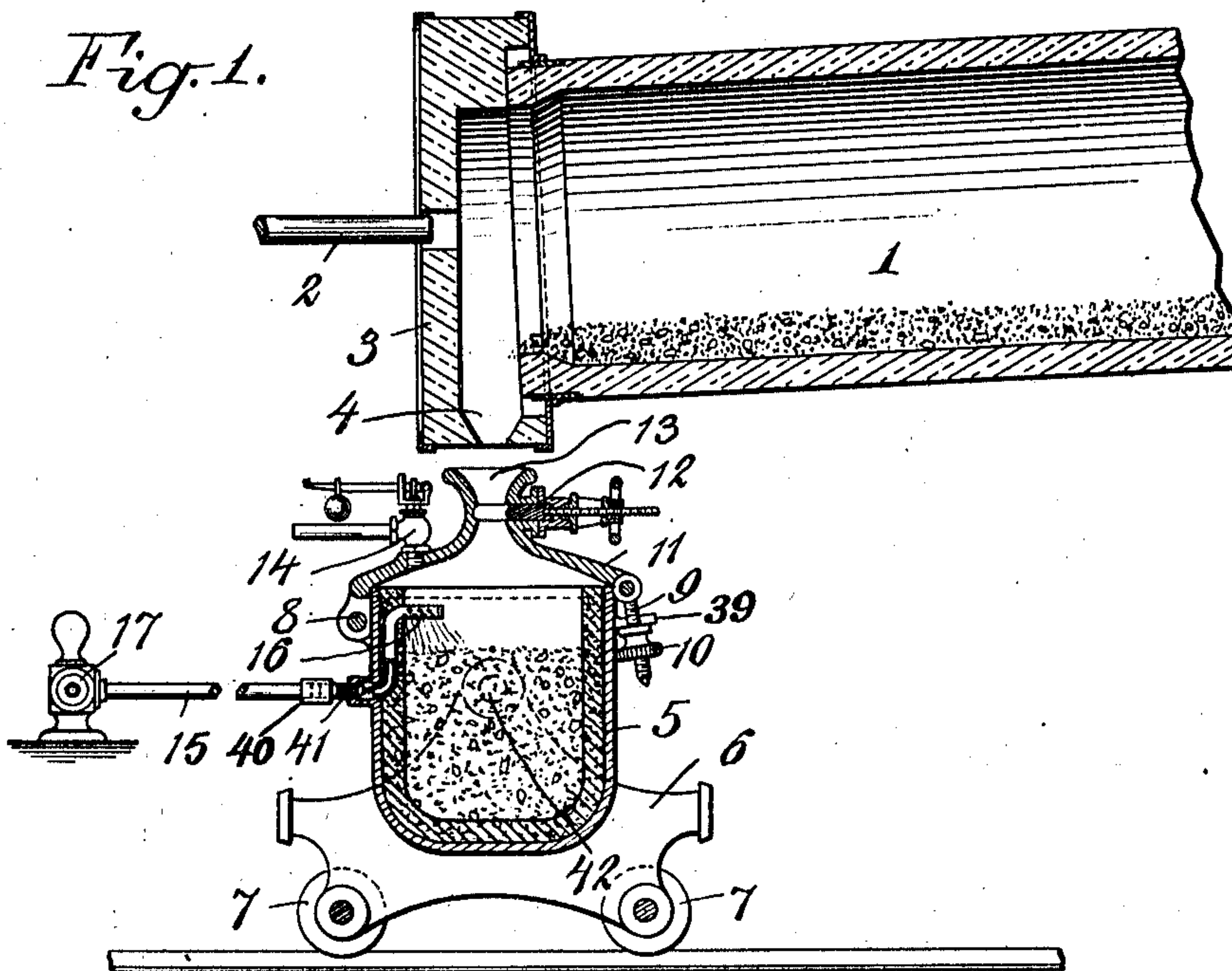
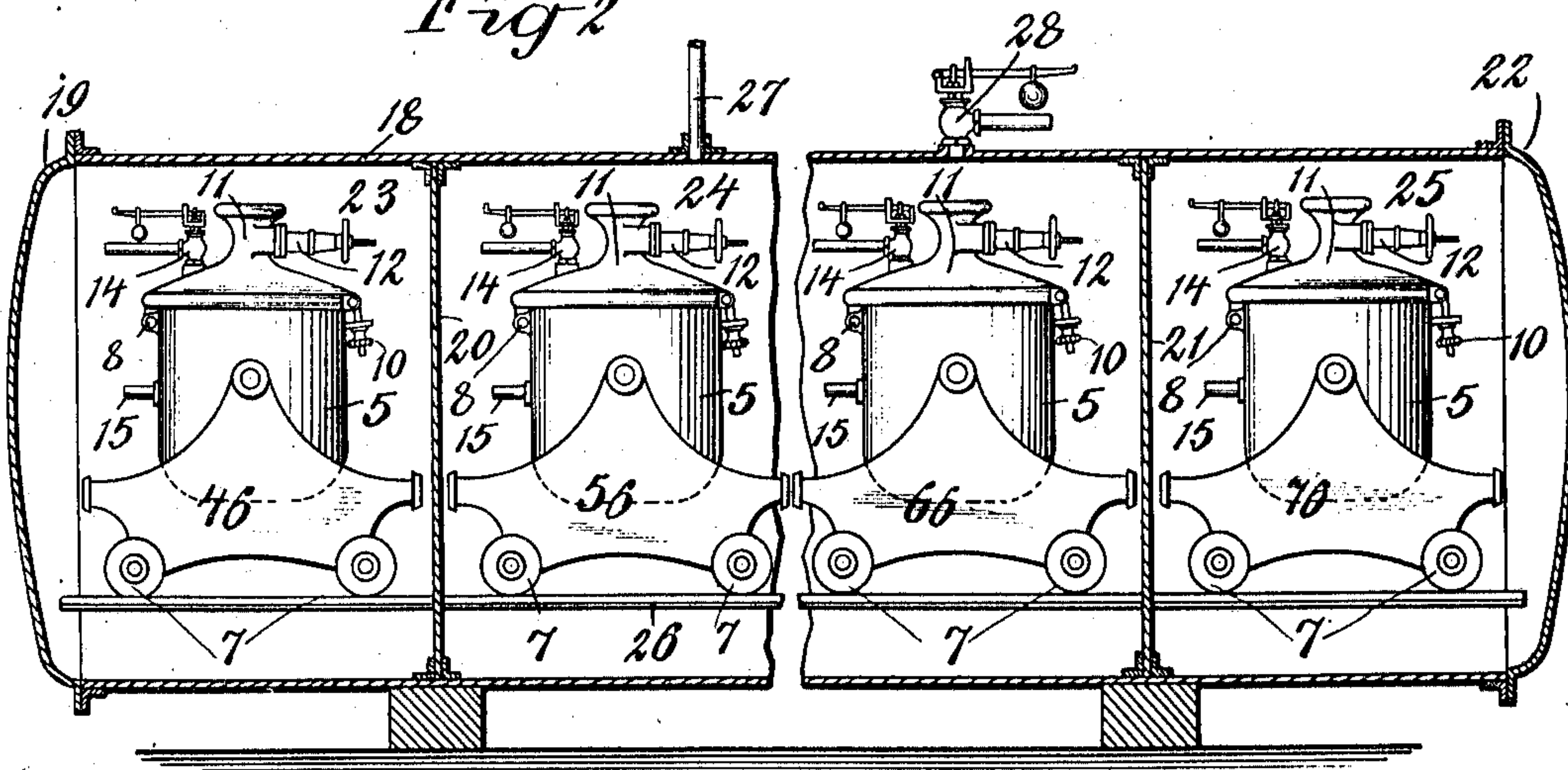


Fig 2



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## CEMENT-TREATING PROCESS.

988,724.

Specification of Letters Patent.

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### *To all whom it may concern:*

Be it known that we, ROBERT W. LESLEY, residing at Haverford, and HENRY S. SPACKMAN, residing at Ardmore, county of Montgomery, and State of Pennsylvania, citizens of the United States, have made certain new and useful Inventions Relating to Cement-Treating Processes, of which the following is a specification, taken in connection with the accompanying drawings, forming part of the same.

This invention relates to cement treating processes and relates especially to processes for treating Portland cement clinker, for example, by running the intensely heated clinker from a rotary kiln into a receiver and treating the same for the desired time with steam at high pressure generated by spraying water upon the heated material in a closed receiver or otherwise, so that the clinker is disintegrated or made friable so as to facilitate grinding and its aging or hydration to the desired extent is effected, that is, the free or objectionably loosely combined lime or magnesia in the clinker is hydrated or reduced to other forms.

In the accompanying drawing showing in a somewhat diagrammatic manner illustrative apparatus for carrying out these processes, and in which the same reference numeral refers to similar parts in the several figures, Figure 1 is a vertical section showing a receiver in connection with a cement kiln; and Fig. 2 is a vertical section showing a treating chamber and receivers.

One form of receiver which may be used in carrying out this process is illustrated as comprising the carriage 6 mounted on wheels 7 and carrying the trunnions 42 of the receiver 5 so that the receiver may be more readily emptied. The receiver may be constructed of heavy metal with an open top and provided with a heat insulating lining of refractory material, if desired. If desired also the receiver 5 may be provided with a heavy cover 11 pivoted about the pin 8 and firmly held in closed position by the clamping screw 9 and nut 10 cooperating with the lugs 39 on the receiver so as to hermetically close the same in connection with suitable packing, if desired. The cover may be provided with a suitable funnel shaped throat 13 formed with a gate or other tight closure 12. It is also desirable

to form a suitable safety or relief valve 14 on the receiver or cover so as to prevent the development of excessive pressure within the receiver. Any desired arrangement may be used for supplying water or other aqueous material, such as steam under pressure, to the receiver and this may be done by mounting a suitable sprayer 16 in the receiver so as to allow water or steam to be forced past the check valve 41 to act on the charge of material. A suitable pump 17 may under these conditions supply water under pressure through the pipe 15 connected by the coupling 40 with the sprayer.

The Portland cement clinker, for example, produced in the rotary kiln 1 heated by the burner tube 2 in the ordinary way, may be allowed to fall through the clinker chute 4 in the hood 3 so as to enter the throat 13 of the receiver. When a sufficient charge has accumulated in the receiver the gate 12 may be closed and water or steam from the sprayer 16 forced upon the highly heated clinker material which immediately produces superheated steam and creates as high a steam pressure as desired, this pressure being regulated of course within the desired limits by the safety valve 14. It is, of course, understood that while this treatment is taking place in one receiver another empty receiver may be moved into charging position under the clinker chute so as not to interrupt the operation of the kiln. Steam under such high pressures as one hundred or two hundred pounds, for example, exerts a strong disintegrating action on cement clinker and in some cases completely pulverizes the same and with clinker of other compositions disintegrates the clinker sufficiently to make it very friable and materially reduce the difficulty of grinding. Such steam treatment, of course, effects the thorough hydration of any free lime or magnesia which might otherwise be objectionable in the finished cement so as to effect an artificial aging of the cement and render the finished product much more reliable. This high pressure steam treatment may be continued for a considerable time in the receiver when using water in such a closed receiver, as indicated in Fig. 1, that is, until the heat of the clinker has been dissipated. If with the particular material treated this duration of treatment is sufficient the



clinker may be quickly cooled by removal from the receiver or by further treatment with low pressure steam or with small amounts of water in some cases, the evaporation of which is substantially sufficient to abstract the surplus heat and leave the material in a practically dry and comparatively cool condition. If it is desirable to continue the treatment for a longer time this may be done by running the receiver into a suitable treating chamber, such as 18, formed with an entrance lock 23, main treating chamber 24 and discharge lock 25. By opening the end gates 19, the receiver carriage may be run into the entrance lock upon the track 26 so as to assume the position 46 and then by opening the lock gates 20 the receiver may move down the suitably inclined tracks 26 so as to assume the position 56, the gates being properly manipulated as in the case of the treatment of sand-lime brick and similar material. Steam under the desired pressure may be supplied to the chamber 24 through the steam supply pipe 27, the pressure being of course regulated by the use of suitable relief valves such as 28, which may be used on the various compartments of the chamber. This steam can, of course, force its way past the check valves in the pipes 15 into the various receivers or the gates 12 may be opened before running the receivers into the treating chamber. The receivers may be kept within the treating chamber for any desired length of time, the treatment lasting for a number of hours, if desired, to thoroughly act upon the material, the treating chamber being of course made sufficiently long to accommodate the desired number of receivers. Finally the receivers are taken out of the chamber 24 past the lock gates 21 and then past the end gates 22. If desired, of course, instead of commencing this hydration treatment of the clinker in the primary receiver adjacent the kiln as described, the receiver containing the charge of clinker from the kiln may be run directly into the treating chamber and there put under steam pressure of preferably about one hundred or two hundred pounds per square inch, although lower pressures may be used in the primary receiver treatment adjacent the kiln and in this process, but necessitate longer treatments. In this case, it is not, of course, necessary to employ any covers for the receivers which merely convey hot clinker, or if desired cold clinker into the treating chamber, which maintains the steam pressure without depending upon the strength of the receiver itself, so as to effect the desired aging and to promote the disintegration of the treated material. The duration of the steam treating process seems to depend upon the steam pressure used, the chemical composition of the clinker, the temperature at which it was burned and the

temperature at which it is brought into contact with the steam; and generally speaking, higher steam pressure, higher lime content in the clinker, softer burning of the clinker and higher temperature of the clinker when brought into contact with the steam promote and hasten the aging and disintegrating action.

Having described this invention in connection with illustrative examples and forms of apparatus, to the details of which disclosure the invention is not of course to be limited, what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

1. The cement process which consists in running highly heated cement clinker into a receiver, in hermetically closing said receiver and spraying water into contact with the highly heated material and in maintaining the high pressure steam developed in contact with the clinker material to effect the disintegration and aging thereof and in moving said receiver into a treating chamber and subjecting the receiver and contained material to the action of high pressure steam to effect further disintegration and aging.

2. The cement process which consists in running highly heated cement clinker into a receiver, in closing said receiver and spraying aqueous material into the same and maintaining said receiver under high pressure to effect the disintegration and aging of the clinker material and in moving said receiver into a high pressure treating chamber and subjecting the same and the contained clinker material to the action of high pressure aqueous material to effect further disintegration and aging.

3. The cement process which consists in spraying highly heated cement clinker with aqueous material and maintaining the same under high pressure to effect disintegration and aging thereof.

4. The cement process which consists in treating highly heated cement clinker with aqueous material under pressure of about one hundred or two hundred pounds to the square inch to effect disintegration and aging of such material.

5. The cement process which consists in treating heated cement clinker material with aqueous material under high pressure to effect disintegration of said clinker material.

6. The cement process which consists in running highly heated cement clinker directly from a kiln into a receiver, in hermetically closing said receiver and forcing aqueous material into contact with said clinker material and in maintaining the same under high pressure to effect the disintegration and aging of said clinker material.

7. The cement process which consists in treating clinker material with aqueous va-



por under the pressure of about one hundred to two hundred pounds per square inch for sufficient time to effect disintegration and aging thereof.

- 5 8. The cement process which consists in treating clinker material with aqueous vapor under high pressure for sufficient time to age the same and render the same friable and easily grindable.
- 10 9. The cement process which consists in treating cement clinker material with aque-

ous vapor under high pressure to promote the friability and aging thereof.

10. The cement process which consists in treating highly heated cement clinker with 15 aqueous vapor under high pressure to promote the disintegration and aging thereof.

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