(No Model.) 3 Sheets—Sheet 1.

E. COIGNET.

APPARATUS FOR THE PREPARATION OF CONCRETE.

No. 369,920. Patented Sept. 13, 1887.

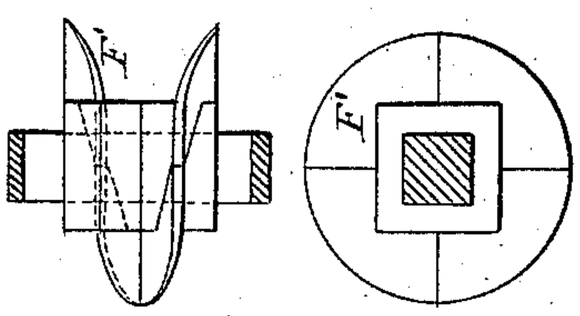

FIG. 4.

FIG. 1.

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Inventor:
Edmond Coignet
by his Attorneys
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FIG. 2.

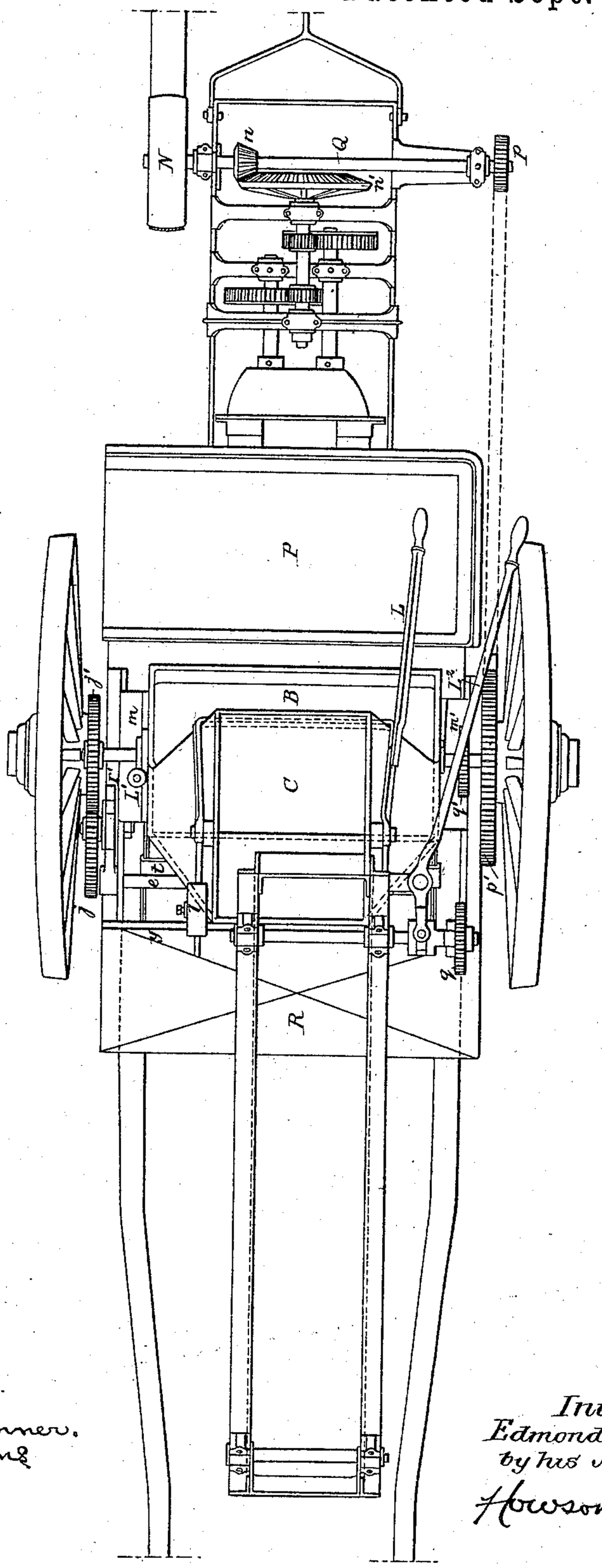

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FIG. 3.

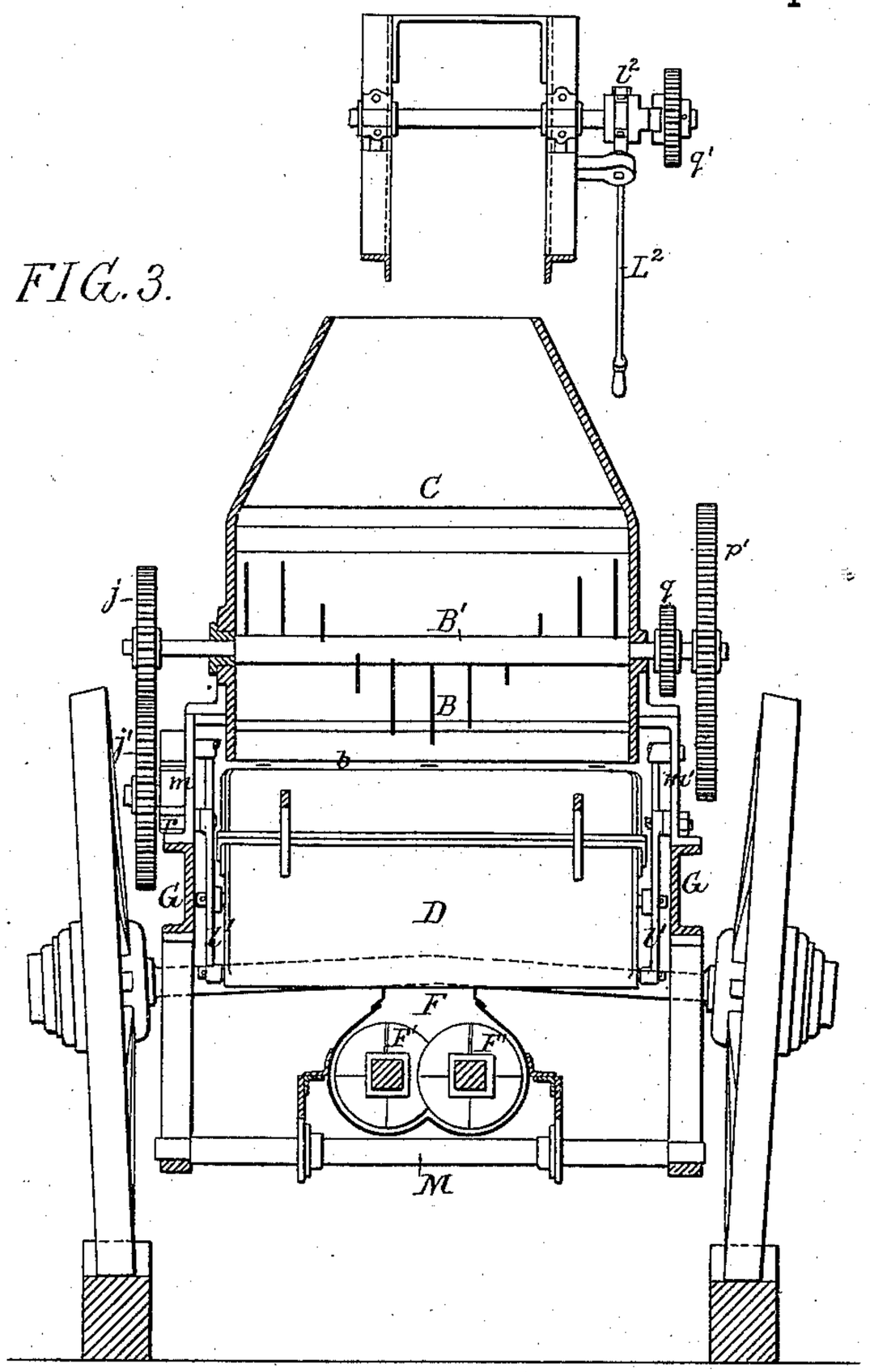


FIG. 5.

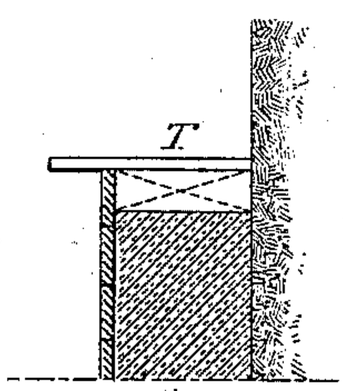


FIG. 6.

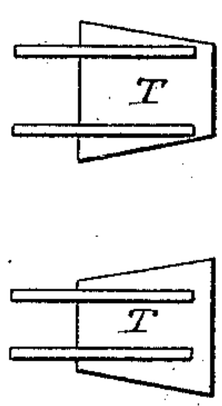
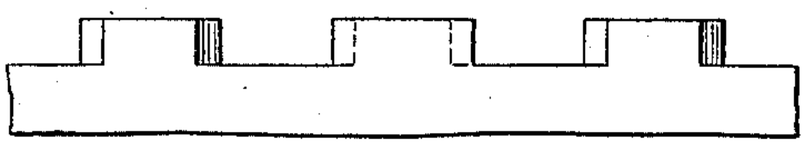


FIG. 7.



Witnesses:
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UNITED STATES PATENT OFFICE.

EDMOND COIGNET, OF PARIS, FRANCE.

APPARATUS FOR THE PREPARATION OF CONCRETE.

SPECIFICATION forming part of Letters Patent No. 369,920, dated September 13, 1887.

Application filed December 14, 1886. Serial No. 221,572. (No model.) Patented in France February 1, 1886, No. 173,888, and in England November 22, 1886, No. 15,211.

To all whom it may concern:

Be it known that I, EDMOND COIGNET, of Paris, (Seine,) in the Republic of France, have invented Improvements in the Preparation and Treatment of Béton or Concrete, and in the apparatus employed therein, of which the following is a specification.

This invention relates, first, to the mixing of the materials employed in making béton or concrete; secondly, to the arrangement or construction of apparatus for mixing and triturating or reducing the said materials, and, thirdly, to the operation of ramming or laying the said materials in the molds.

The concrete or artificial conglomerate known in France as "béton Coignet" is prepared by mixing together sand, lime, and cement, slightly moistened with water, and triturating this mixture in cylindrical machines or mills. The pasty composition thus obtained is delivered into molds, in which it is compressed by ramming, performed by hand or mechanically. In order that the blocks or structures formed with this material may be of a homogeneous nature it is necessary to pay unremitting attention to the proportions of sand, lime, and cement passing through the mill. There is comparatively little difficulty on this point in operating small mills working intermittently and dealing with small quantities only of materials at a time; but it is otherwise in the case of large mills working continuously. In order to obtain a better result the materials are turned over on the ground with shovels before throwing them into the mill. This method involves a considerable amount of labor, and is, moreover, an irregular and clumsy expedient, and the mill has to do the work of mixing as well as that of triturating or reducing the materials. The effectual mixing of the materials is also impeded by the water that is sprinkled over them when they are yet imperfectly mixed, the lime and cement thus wetted caking together in lumps, which do not readily mix with the sand. In laying and ramming the concrete in the molds a certain amount of difficulty is experienced in practice in effecting a perfect union between the parts that are laid on different days. It is necessary to carefully clean and scrape the surface of the concrete already laid and to wet it before proceeding to put on the next layer. These preparations are liable to be frequently neglected or carelessly performed by the workmen, and the solidity of the structure is consequently endangered, owing to the imperfect union that takes place. All these disadvantages are obviated by means of the improvements in the preparation and treatment of concrete forming the object of this invention, as hereinafter described. The mixing of the materials must be performed before they are wetted, and in a specially-constructed apparatus, a small quantity of materials being mixed at a time, after which the materials, spread in a thin layer, are sprinkled with water at the same time as they are transferred to the hopper of a continuously-acting reducing-mill. Chloride of calcium added to this mixture, even when it consists simply of sand and lime, has the effect of accelerating and promoting the setting. Moreover, chloride of calcium, being of a deliquescent nature, retards the drying, and thus enables the limes and cements to harden gradually under the most favorable conditions. The chloride of calcium may be used either in the form of a solution in the water which is thrown over the mixture or, preferably, by mixing it with the lime just before the latter is mixed with the other materials.

In order that my said invention may be fully understood, I shall now proceed more particularly to describe the same, and for that purpose shall refer to the several figures on the annexed sheets of drawings, the same letters of reference indicating corresponding parts in all the figures.

An apparatus employed for effecting the mixture and trituration of the materials according to this invention is illustrated in vertical and longitudinal section in Figure 1 of the accompanying drawings, Fig. 2 being a plan, and Fig. 3 a section taken along the line 1 2 3 4, Fig. 1. Fig. 4 illustrates two views of a section of one of the mixer-shafts. Fig. 5 is a sectional view illustrating the manner of building a structure of the molded concrete. Fig. 6 illustrates two forms of molding-blocks, and Fig. 7 is a view illustrating a form of joint used in building structures of the concrete.

This apparatus is carried on an iron frame,

G, which may be provided with shafts and mounted on traveling wheels, as shown in the drawings. The frame G carries a foot plate or platform, P, surrounded by a railing for the workman, a water-cistern, R, provided with a perforated tube and cock, *r*, a mixer, B, and a measuring box or hopper, C, cast in one piece, and a shaking or vibrating table, D. A ladder-shaped support or frame, made in two parts, is attached to the side of the hopper C, and carries a chain bucket-elevator, A. Underneath the frame G there is a triturating or reducing mill, F, hung upon a shaft, M, supported by the side beams.

All the operating parts of this apparatus receive motion from a shaft, Q, driven by a pulley, N, and a belt connected with a portable engine or other suitable motor. This shaft drives the mill F by means of bevel-gear *n n'*, and the mixer B by means of sprocket-wheels *p p'*, Figs. 2 and 3, and an endless chain. The mixer transmits motion to the shaking table D through wheels *j j'*, and also drives the elevator by means of chain-wheels *q q'*. The elevator-shaft is provided with a clutch, l^2, operated by a lever, L^2. I do not limit myself to these methods of transmitting motion to the various parts, as the same may evidently be modified according to circumstances without affecting the principles of the invention, and an elevator of any suitable construction may be employed to carry up the sand and deliver it into the measuring-hopper C, in place of the elevator illustrated in the drawings. The measuring-hopper C is made with sides inclined at an angle corresponding with the natural slope of the sand, in order to insure its filling, and is provided with a door, *c*, in the form of a segment of a horizontal hollow cylinder, capable of being turned on an axis, *a*, by means of a hand-lever, L, provided with a counter-weight, *l*. This arrangement enables the sand, even when wet, to be instantaneously discharged from the measuring-hopper. The sides of the mixer B are preferably cast in one with those of the hopper C, so that there may be no unevenness of surface liable to obstruct the motion of the sand.

A laborer standing on the platform P throws a measured quantity of lime and cement into the mixer along with the sand, and the materials are effectually stirred and mixed by rotating arms carried on a horizontal shaft, B', arranged in the mixer, as indicated in the drawings. A discharging-door, *b*, in the form of a segment of a hollow cylinder, capable of being turned eccentrically on a center, *a'*, by means of a hand-lever, L', enables the contents of the mixer to be discharged bodily and intermittently onto the shaking or vibrating table D, located underneath. The mixer is mounted upon supporting-plates *m m'*, for the purpose of enabling the apparatus to rest conveniently upon the frame G. The shaking table D is suspended from the plates *m m'* by vibrating links *l'*. An arm, *d*, carried by the shaft *e*, operated by a pawl or wiper acted on by a ratchet or cam, *r'*, pushes against a transverse bar, *t*, attached to the table, and causes the latter to move toward the right-hand side of the machine. Springs *x* impel the table in the opposite direction toward a transverse bar, *y*, when the cam releases the wiper, and thus imparts to it a shock or jerk, which throws off a portion of the mixture. A slide or adjustable door, *v*, enables the quantity thus intermittently discharged to be regulated and causes it to be delivered in a thin layer, while the perforated tube *r* sprinkles water thereon, which water may or may not contain chloride of lime in solution, and is supplied from the cistern R.

The mixed and wetted materials are delivered into the hopper of the reducing-mill F, which is provided with rotating arms or stirrers F', in the form of portions or segments (about one-fourth of an inch) of a helix cast on bosses passed over square shafts, as illustrated in Fig. 3 and in the detail, Fig. 4. Under these conditions the construction of the helix or helices and the renewal of worn parts is facilitated. It is evident that the construction and arrangement of the apparatus hereinbefore described may be modified in various ways without affecting the spirit of the invention. For example, when the mill F cannot be conveniently arranged underneath the mixer, the mixed and wetted materials may fall into a trough or trench, whence they are conveyed to the mill by a suitable elevator. The mill F, however constructed or arranged, is enabled to be utilized throughout its entire length for reducing the materials which have been previously mixed. The manufactured béton, which is delivered by the mill at X, is discharged onto the ground, sliding down an inclined plane, at the bottom of which it is received by or shoveled into wheelbarrows and carried to the place where it is required. If preferred, the prepared béton may be delivered directly into trucks W from the mill, whose discharge-orifice is sufficiently elevated to enable them to be conveniently delivered in this manner.

At the same time as the mill F is treating the materials supplied thereto from the table D a fresh batch is being prepared in the mixer B.

It will be readily understood that the working of the elevator and of the mill is continuous, but that of the mixer is intermittent, inasmuch as the mixer deals with measured quantities or batches of materials at a time.

The measuring-hopper C thus acts as an intermediary between a continuous movement and an intermittent movement, and the table D acts in a similar manner between an intermittent movement and a continuous movement. These two parts of the apparatus form a species of reserves enabling the action of the apparatus, considered as a whole, to be regarded as continuous or uninterrupted from

the operation of taking up the sand by the elevator to that of delivering the prepared concrete or béton.

The advantages of the arrangement hereinbefore described when compared with those heretofore employed are as follows: First, a perfectly homogeneous and pure composition is imparted to all parts of the structure which may be built of the composition; second, the mill is enabled to produce a maximum of useful effect—that is to say, is employed solely for reducing in place of having to do the work of mixing as well as reducing, as in the apparatus heretofore employed; the reducing action on which the strength of the structure in great measure depends is thus augmented and the strength of the structure is proportionately increased; and, third, a considerable saving of labor is effected, two laborers only being sufficient to attend to the apparatus, one being employed on the platform P for introducing the required quantities of lime and cement into the mixer and for working the levers L L′ L², the other being stationed at the foot of the elevator, in order to supply the latter with sand and regulate the supply of water from the tube *r*.

In order to insure a perfect union or continuity of the structure built of the composition at the parts where the operation of laying and ramming has been temporarily suspended or interrupted, blocks or pieces of wood, T, Figs. 5 and 6, of trapezoidal form and suitable thickness, are employed, being placed on the concrete when the mold is filled to within a certain distance from the top. These pieces of wood being arranged at intervals of, say, about three feet, with their upper sides flush with the top of the mold, the remainder of the concrete is thrown down and rammed. When the blocks (which, if necessary, are carefully arranged so that the thick ends alternate with the thin ends) are removed along with the mold, they leave recesses or hollows in the upper surface of the concrete, which presents a toothed appearance in elevation, as indicated in Fig. 7. When the work is recommenced, the fresh concrete is first rammed into these recesses and afterward over the entire surface. Two walls or masses are thus produced, which are effectually interlocked in a vertical direction, and their displacement in a horizontal direction relatively to one another is rendered impossible, owing to the taper or wedge shape imparted to the recesses by the blocks T.

I claim—

1. The mode herein described of preparing concrete composition, said mode consisting in first mixing the materials in a dry condition, spreading the mixed materials in thin layers and wetting the layers, and finally triturating or reducing the mixed and wet material, all substantially as set forth.

2. The mode herein described of preparing concrete composition, said mode consisting in first mixing the materials in a dry condition, then wetting the materials and mixing chloride of calcium therewith, and reducing the mixture, substantially as specified.

3. The mode herein described of laying concrete, said mode consisting in forming in the upper surface of one layer tapering or wedge-shaped recesses facing in opposite directions and ramming the fresh concrete into these recesses for the next layer, in order to interlock the layers, substantially as set forth.

4. The combination of the mixer with a hopper, shaking table, and reducing-mill, substantially as described.

5. The combination of the mixer and shaking table below it with a reducing or triturating mill, into which the material from the table is fed, substantially as described.

6. The combination of the mixer and shaking table below it with a reducing or triturating mill and a tank to sprinkle liquid over the mixed materials, substantially as set forth.

7. The herein-described apparatus for preparing concrete, said apparatus consisting of a mixer, hopper, and elevator therefor, with a shaking table below the mixer, a water-sprinkler, and a triturating or reducing mill, all substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDMOND COIGNET.

Witnesses:
LÉON CRAUEFHEN,
ROBT. M. HOOPER.