April 9, 1929. C. E. G. L. JARRETT-KNOTT 1,708,839

MECHANICAL VIBRATING RAMMING DEVICE

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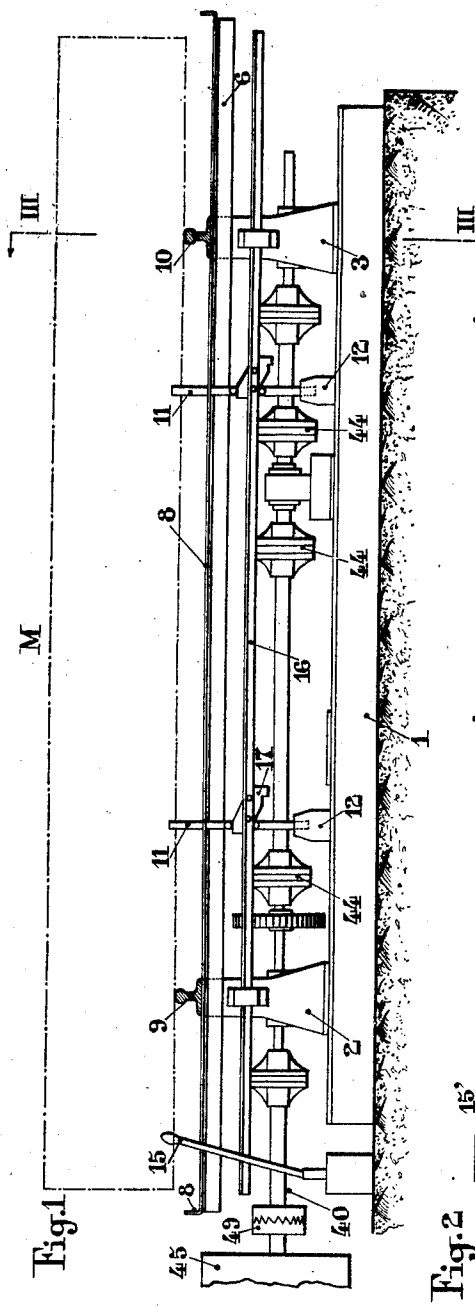


Fig.1

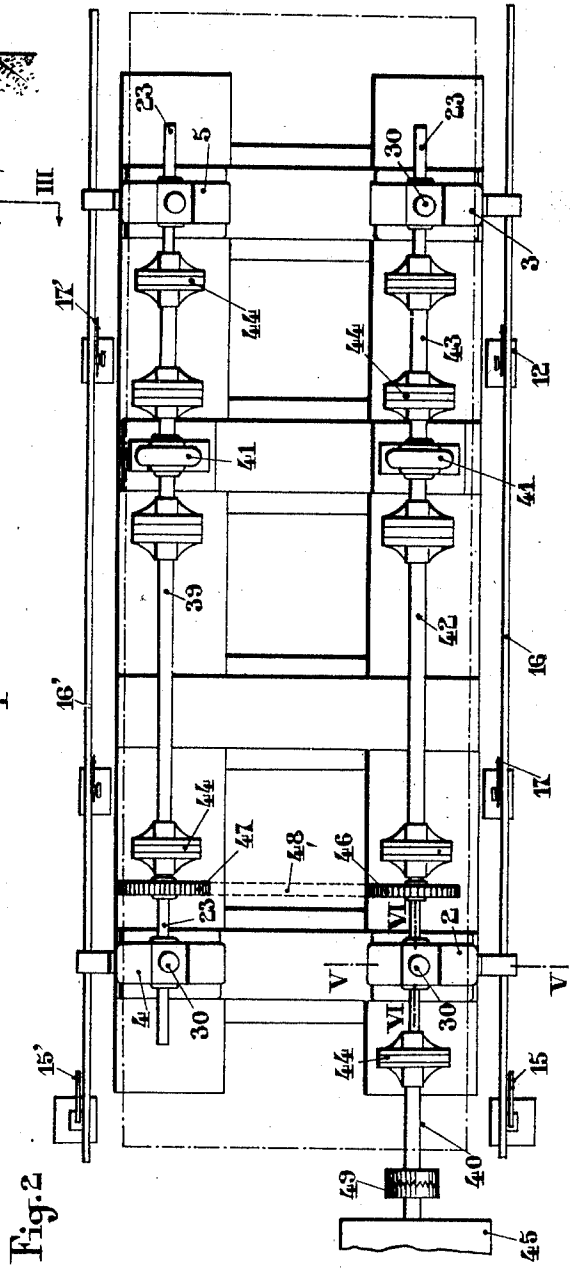


Fig.2

Inventor:
C.E.G.L. Jarrett-Knott,
By Langner, Parry, Card & Langner
Atty

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Fig. 3

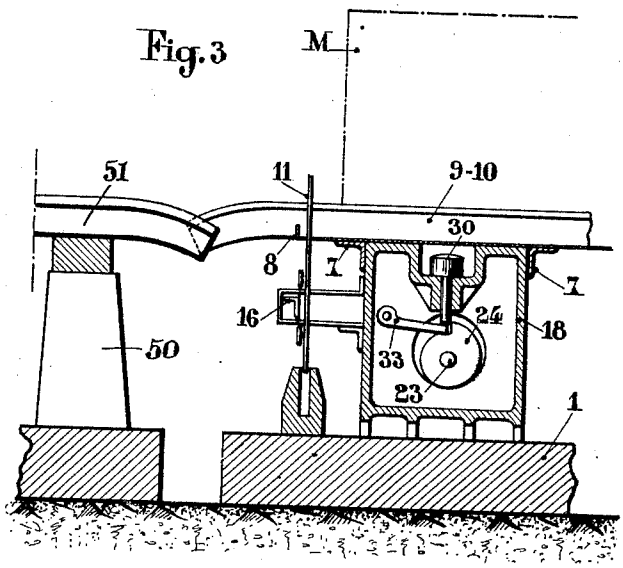
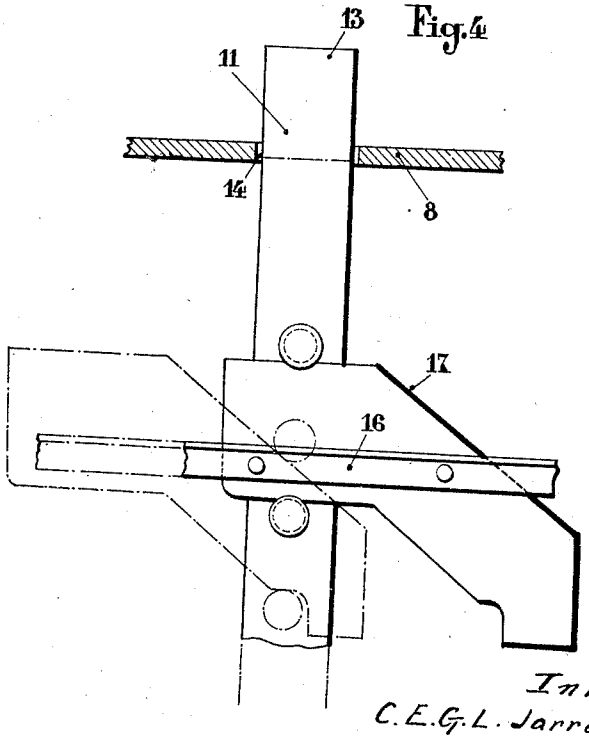


Fig. 4



Inventor:
C. E. G. L. Jarrett-Knott,
By
Langner, Parry, Card & Langner
Attys.

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Fig. 5

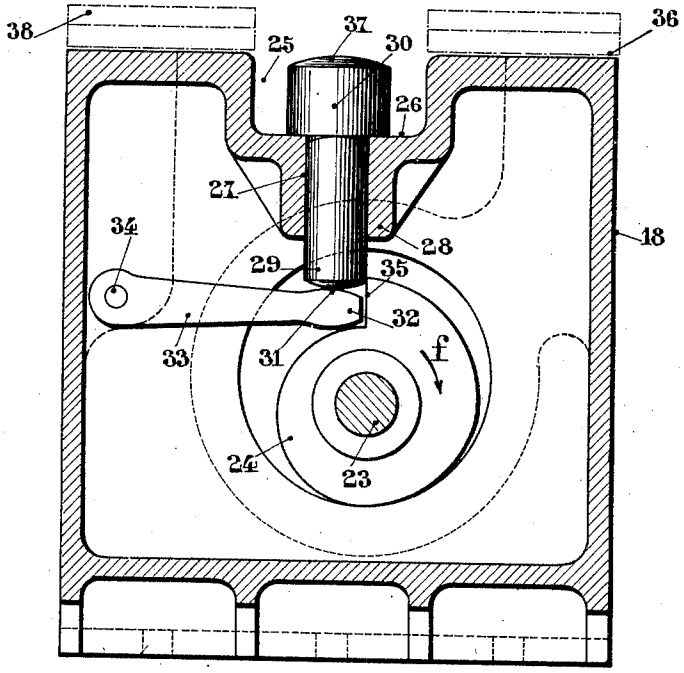
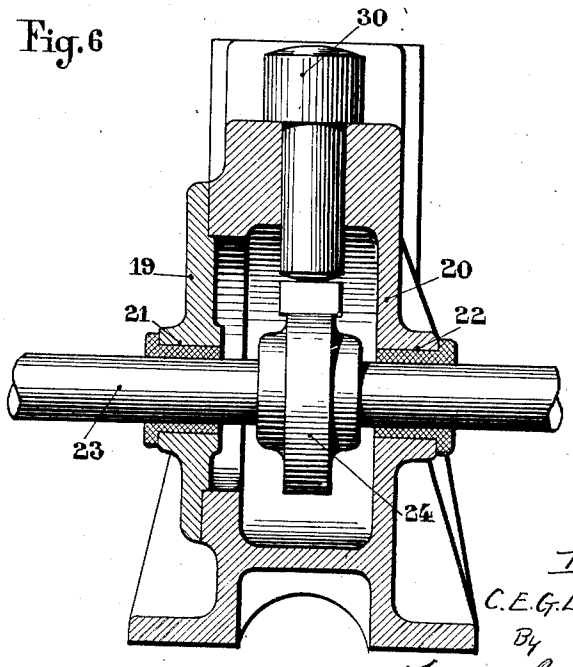


Fig. 6



Inventor:
C.E.G.L. Jarrett-Knott,
By
Langner, Parry, Card & Langner
Attys

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UNITED STATES PATENT OFFICE.

CHARLES EDOUARD GEORGES LOUIS JARRETT-KNOTT, OF PARIS, FRANCE.

MECHANICAL VIBRATING RAMMING DEVICE.

Application filed August 27, 1927, Serial No. 215,868, and in France June 5, 1927.

The present invention has for its subject an improved apparatus for the production of moulded articles of all types and more particularly for the manufacture of moulded articles of concrete which may be reinforced or not.

It is well known that in the latter case it is essential in order to obtain satisfactory products to effect careful ramming and if desired, supplementary compression, so as to obtain a mass as compact as possible.

On this compactness, with complete absence of empty spaces in the mass and a good covering of the reinforcements and of any other elements which may be incorporated in the article which is manufactured, depends to a large extent the strength of the article produced.

In order to obviate the disadvantages of ramming and compression by hand, which necessitate a considerable expense in manual labour and never produces an efficient result, as their execution depends more or less on the skill of the workmen employed for the manufacture, various presses, jogging tables, vibrating tables, and so forth have been suggested for the purpose of effecting, mechanically and automatically, the ramming and compression in question.

The various existing devices, however, are for the most part adapted for the production of special articles and are not of general application. Usually the mould which is used forms a part of the apparatus itself.

This however is not the case with the apparatus which forms the subject of the present invention.

The apparatus according to the invention is constructed in such a manner as to be capable of subjecting any suitable mould, which is simply placed on the frame forming the upper part of the apparatus, to vertical movements (rising and falling) which are rapid and repeating and of an adjustable amplitude, so as to effect automatically an efficient settling of the material or mixture of materials which have been placed into the mould.

By reason of the fact that the mould and the apparatus are independent of one another, the apparatus, which constitutes a new industrial product and which is of general application may, without any modification, be used for the manufacture of the most varied moulded articles such as reinforced concrete, railway sleepers, brackets, blocks, stones traversing the whole thickness of a wall and so forth.

The apparatus forming the subject of the present invention is characterized by the following features.

1. By its general form of construction and operation and particularly by the combination of a stationary framework, with which are associated the jogging devices, with an independent movable carriage simply resting on the said framework in relation to which it is guided in any suitable manner during its movements.

2. By the simultaneous operation of a number of jogging devices, identical with one another, suitably disposed, operating together, in combination with one another and themselves having the following characteristic features.

Each of these devices is provided with a casing forming a cam box and in the interior of which rotates a cam of suitable shape keyed to a shaft capable of being rotated in any suitable manner.

In the upper face of the casing in question there is provided a seating communicating with the interior of the box by means of a cylindrical passage through which passes the tail of a press plunger of which, at the moment of the escape produced by the recoil of the cam, the head, in descending into the interior of the said seating, enables the upper carriage which it has previously raised to strike in falling against the lateral portion of the upper face of the casing.

Finally between the lower end of the tail of the press plunger and the outer surface of the cam is disposed the free end of a lever, acting as a relay, capable of rocking about a shaft secured to the said casing.

By reason of connection by chains and toothed pinions suitably mounted, the various jogging devices (devices which according to their number, that is to say according to the size of the apparatus, are placed in two or more rows) are all actuated from a single source of power, the various jogging devices which are placed in the same row may be actuated either by means of a continuous transmission shaft or by means of a sectional transmission shaft, of which the separate sections are connected together in

any suitable manner, by means of coupling sleeves, flexible shafts or any other suitable device.

According to the nature of the articles to be treated it is possible, by increasing or reducing the speed of rotation of the shafts for actuating the cams, to vary in any suitable manner the number, per unit of time, of the shocks to which the carriage of the apparatus and the mould placed on its carriage are subjected.

By providing on the upper faces of the cam boxes, wedges or blocks, formed if desired by simple plates of metal or of any other suitable substance, it is possible, if desired, to reduce the amount of the jerks and consequently vary the forces of inertia brought into play by each of them.

Finally for each particular case it is possible to vary the time during which the article which is being treated rests on the apparatus.

There are, therefore, provided three elements of adaptation of the apparatus: fall and height of jerks, and time during which the article rests on the apparatus or, what comes to the same thing, number of jerks to which an article is subjected for a given fall.

It will thus be readily seen that the apparatus in question permits of effecting with great rapidity and under absolutely efficient conditions, the settling which it is desired to obtain and it will be seen that consequently this apparatus is capable of carrying out the largest number of operations.

In the accompanying drawings there is illustrated by way of example one form of construction of the invention.

Figure 1 shows in elevation a diagrammatic view of the apparatus.

Figure 2 shows a plan of the framework, the carriage being removed so as to enable the jogging devices and the operating mechanism for these devices to be seen.

Figure 3 shows to a larger scale a section on the line III—III of Figure 1.

Figure 4 shows to a larger scale a detail of the operating mechanism for the guides of the carriage and of the mould.

Figure 5 shows to a larger scale a section of the jogging devices, the section being taken on the line V—V of Figure 2, and

Figure 6 shows to the same scale as Figure 5 a section of the same device on the line VI—VI of Figure 2.

As seen in Figures 1, 2 and 3 the apparatus consists of a stationary framework 1 forming a base and on which are mounted the four jogging devices 2, 3, 4 and 5 used in the case to be described.

On the jogging devices rests a carriage 6 formed by an assemblage of angle irons 7 covered by a sheet of protecting material 8 adapted to prevent the waste of material to be moulded which may accidentally fall from the mould, from falling on the operating mechanism of the lifting devices and which would obstruct and eventually stop the operation of this mechanism.

The protecting sheet 8 is folded on the four sides in the form of a gutter in such a manner as to enable the materials which fall thereon to be subsequently recovered.

Above the protecting sheet 8 are provided rails (two in the present case) 9 and 10 which may for example be formed by rail elements of suitable dimensions.

The mould M is placed on these rails and into the interior thereof is placed the material or the mixture of the materials which are adapted to be subjected to settling.

For convenience, the molds before being placed upon the jogging device may be held by a support 50 having rails 51 which come adjacent the rails 9 and 10.

During the vertical upward and downward movements the carriage 6 is prevented from shifting sidewise by a certain number of pins 11 movable in the interior of guides 12, and of which the free ends 13 pass through openings 14 provided in the protecting sheet 8. The upper end of these pins also serves to hold the mould M from shifting on the carriage.

In order to enable the mould to be placed in position by sliding it on the rails 9 and 10 it is possible, by means of operating levers 15, 15′ acting through the medium of transmission rods or bars 16, 16′ on operating plates 17, 17′, to lower the pins 11, so that they are below the level of the rails. By a reverse operation of the same mechanism it is possible, once the mould has been placed on the carriage, to again raise the pins.

As stated above the raising of the carriage and the mould is effected by a certain number of jogging devices constructed as illustrated in Figures 5 and 6.

As shown in these figures each device consists of a casing 18 of which the base is arranged in such a manner as to be capable of being secured to the framework 1 and in the lateral walls 19 and 20 of which are provided circular openings 21 and 22 provided with suitable linings and acting as bearings for a transverse shaft 23 on which is keyed a cam 24 of suitable shape.

In the upper wall of the casing is provided a seating 25 in the bottom 26 of which is provided a circular opening 27 extended by a sleeve 28 in the interior of which is adapted to slide the tail 29 of a press plunger whose head 30 is accommodated in the interior of the seating 25.

The lower edge of the head 30 bears against the edges of the opening 27 and prevents the said press plunger from passing beyond a determined position corre-

sponding with the shape of the cam at the point which is at the smallest radius of curvature.

Between the lower face 31 of the press plunger and the outer surface of the cam is interposed the end 32 of a pivoted lever 33 acting as a relay and which is hinged to a shaft 34 mounted in the walls of the casing 18.

When turning in the direction indicated by the arrow *f*, the cam 24 produces the gradual lifting of the end 32 of the relay lever 33 (and consequently of the press plunger of which the lower face rests on the lever) by an amount equal to the amount of the step 35.

This vertical movement of the relay and of the plunger is transmitted to the carriage and to the mould which are thus raised by the same amount, it being understood that at the start the carriage rests directly on the upper face of the wall 36 of the casing, the upper face 37 of the plunger being substantially on the same level as the upper face of the casing.

As soon as the step 35 of the cam leaves the end 32 of the lever 33, on the continued rotation of the cam, the lever 33 and the plunger fall and instantly return so as to occupy the position in which they are shown in Figure 5. The carriage and the frame also fall, their fall being stopped by the coming into engagement of the lower face of the carriage with the upper face of the walls 36 of the casings 18 of the various lifting devices.

If desired it is possible, as indicated above, to limit the amount of lifting and the amplitude of the fall of the carriage and of the mould by placing on the upper face of the walls 36 plates or linings 38 such as indicated in chain dotted lines in Figure 5.

It will thus be readily seen that the plunger will not act upon the carriage and the mould until after it has been raised a certain amount by the cam 24 and the end 32 of the relay lever 33.

The cams of the different lifting devices which are used are driven by means of a number of parallel shafts, two in the present case, namely the shafts 39 and 40 which are supported in bearings 41 and which, if they are in sections, the separate sections 42, 43 are connected together by means of flexible shafts or couplings 44.

Of the separate parallel shafts only one, the shaft 40, is connected by means of a pulley 45 to a driving source for producing the rotation of all the shafts, the other parallel shafts (in the present case the shaft 39) being connected to the first shaft by means of pinions 46, 47 and chains 48. By suitably mounting the cams on their shafts and by adjusting the connecting pinions it is possible to obtain as desired either an operation in synchronism of all the jogging devices, which is to be recommended in the majority of cases, or an operation with a certain lag between the separate jogging devices which in certain cases may be of advantage having regard to the nature of the work to be carried out.

Between the driving source and the shaft 40 it is possible if desired to provide any useful accessory members such as fly-wheels, reducing gear and so forth and more particularly a clutch device 49 so as to permit of adjusting exactly the extent at which the shaking operation to which the mould is subjected is to take place as also the instant at which this operation is to cease and consequently the duration thereof.

The multiplicity of jogging devices acting in synchronism permits of obtaining for the lifting of the carriage and of the mould, an action which is much better distributed than in the case where a single jogging device is used.

It also permits of using a carriage of reduced weight for supporting the mould thus resulting in a considerable economy from the point of view of the amount of energy expended.

The apparatus may be used for the manufacture of articles of different dimensions and particularly for the manufacture of articles which are relatively long in relation to their width.

An apparatus provided with six jogging devices suitably arranged in relation to one another can be used for moulding railway sleepers of reinforced concrete, these sleepers being used either for narrow gauge or for large gauge such as normal gauge.

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

1. Mechanical vibrating device for the manufacture of moulded articles comprising a stationary framework, a movable carriage, jogging elements arranged between the stationary framework and the movable carriage, said jogging elements each consisting of a box, a rotary shaft mounted in said box, a cam keyed to said shaft, parallel driving shafts for actuating said cams, actuating means for said shafts, and a clutch disposed between the actuating means and said shafts, a plunger fitted into the top of each of said boxes and adapted to slide therein and a pivotally mounted lever of which the end is interposed between the cam and the lower end of said plunger.

2. Mechanical vibrating device for the manufacture of moulded articles comprising a stationary framework, a movable carriage, jogging elements arranged between the stationary framework and the movable carriage, said jogging elements each consisting of a box, a rotary shaft mounted in said

box, a cam keyed to said shaft, parallel driving shafts for actuating said cams, actuating means for said shafts, and a clutch disposed between the actuating means and said shafts, a plunger fitted into the top of each of said boxes and adapted to slide therein and a pivotally mounted lever of which the end is interposed between the cam and the lower end of said plunger, and means for adjusting the amplitude of the vertical movements of the carriage.

3. Mechanical vibrating device for the manufacture of moulded articles comprising a stationary framework, a movable carriage, jogging elements arranged between the stationary framework and the movable carriage, said jogging elements each consisting of a box, a rotary shaft mounted in said box, a cam keyed to said shaft, parallel driving shafts for actuating said cams, actuating means for said shafts, and a clutch disposed between the actuating means and said shafts, a plunger fitted into the top of each of said boxes and adapted to slide therein and a pivotally mounted lever of which the end is interposed between the cam and the lower end of said plunger, and removable linings fitted between the upper face of said box and the movable carriage.

4. Mechanical jogging device for the manufacture of molded articles comprising a support, a plurality of lifting devices carried in spaced relation by said support, each comprising a driven cam journaled in said support having an abrupt shoulder, and a plunger bearing on the contour of said cam, the plungers being adapted to support a mold, said plungers being arranged to fall abruptly from the abrupt shoulders of said cams in the cycle of operation of the latter and a pivoted buffer member between each plunger and its cam.

CHARLES EDOUARD GEORGES
LOUIS JARRETT-KNOTT.