G. KOMAREK.

FLUXER FOR FUEL BRIQUETTE MATERIAL.

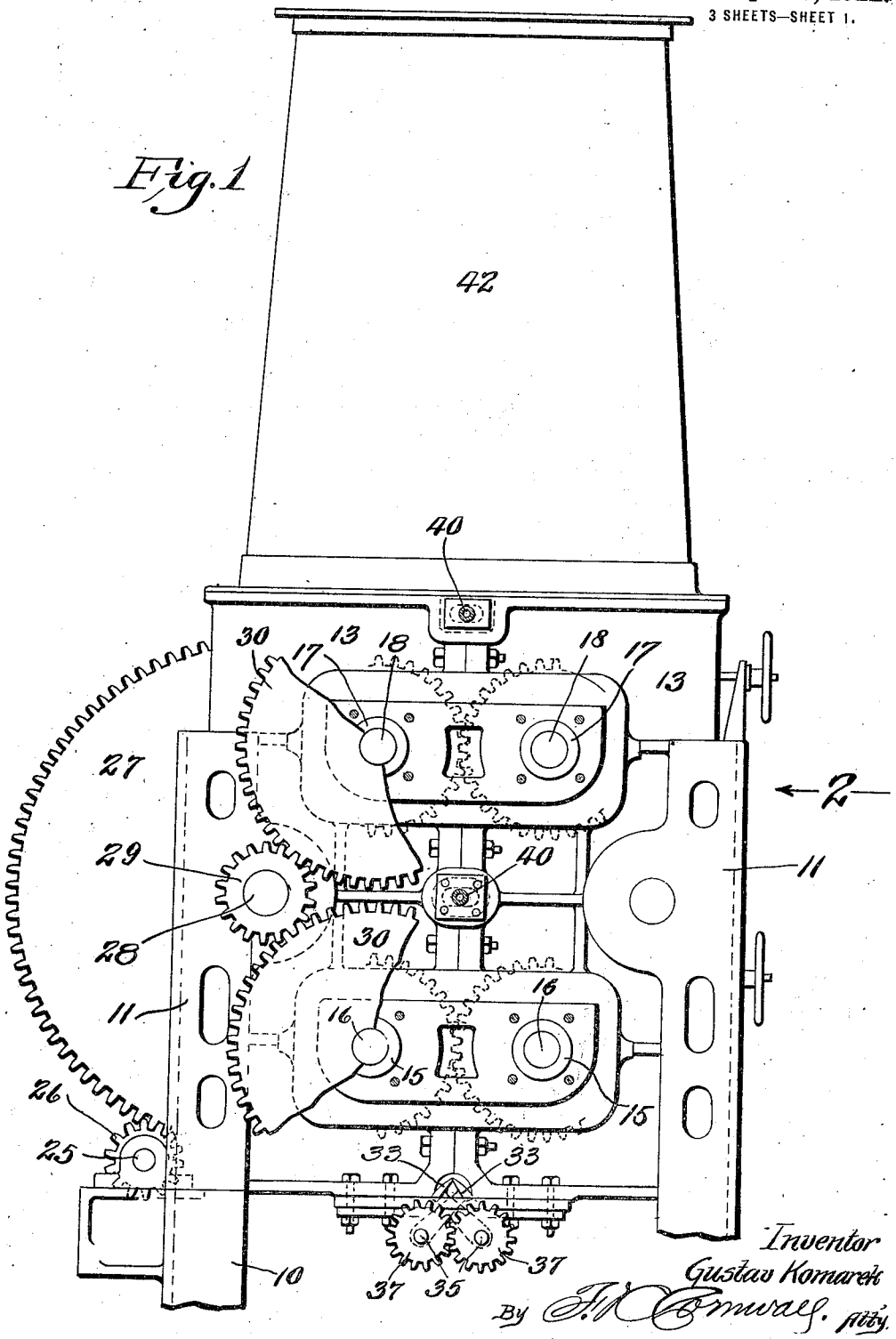
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1,430,384.

Patented Sept. 26, 1922.

3 SHEETS—SHEET 1.

Fig. 1




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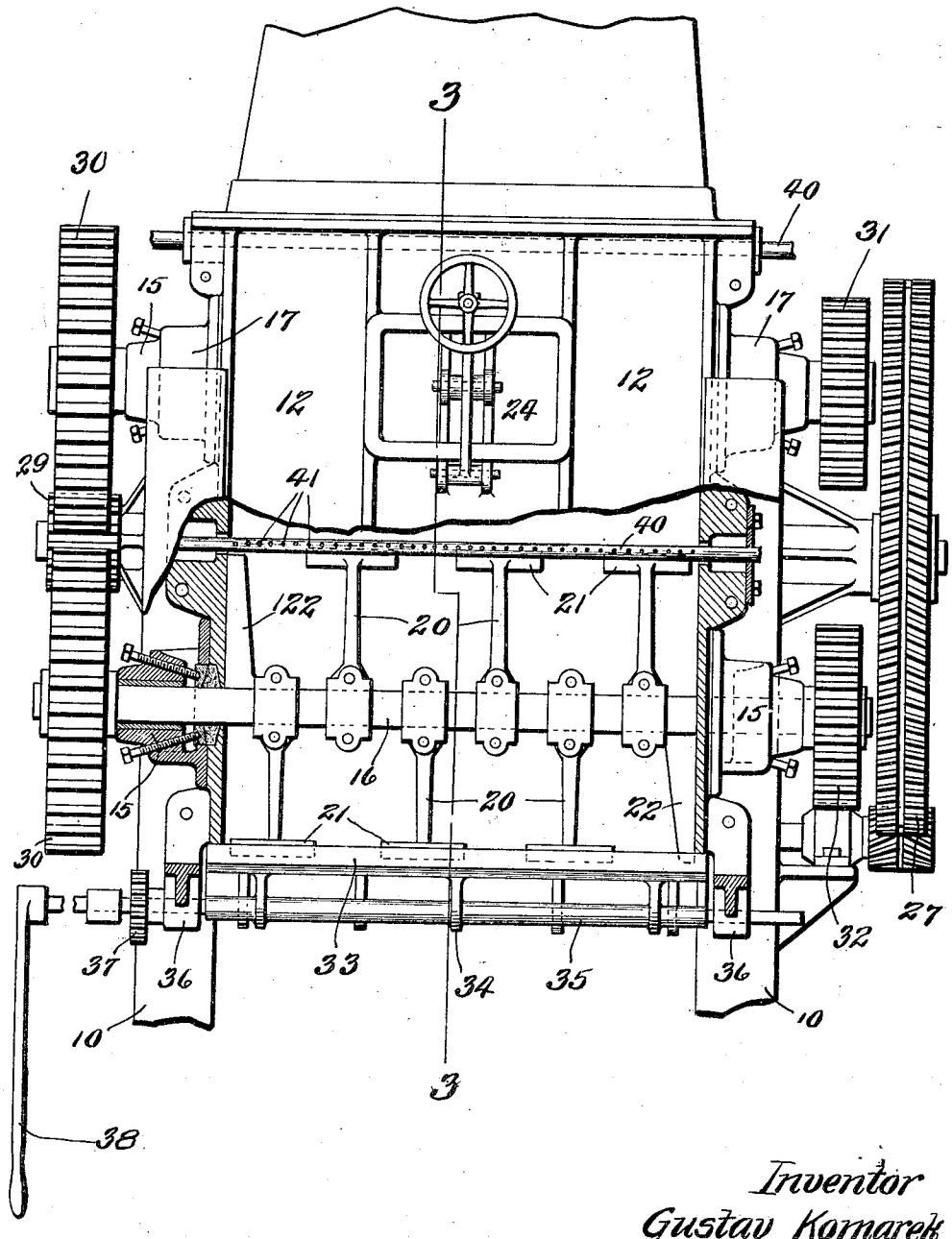
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3 SHEETS—SHEET 2.

Fig. 2




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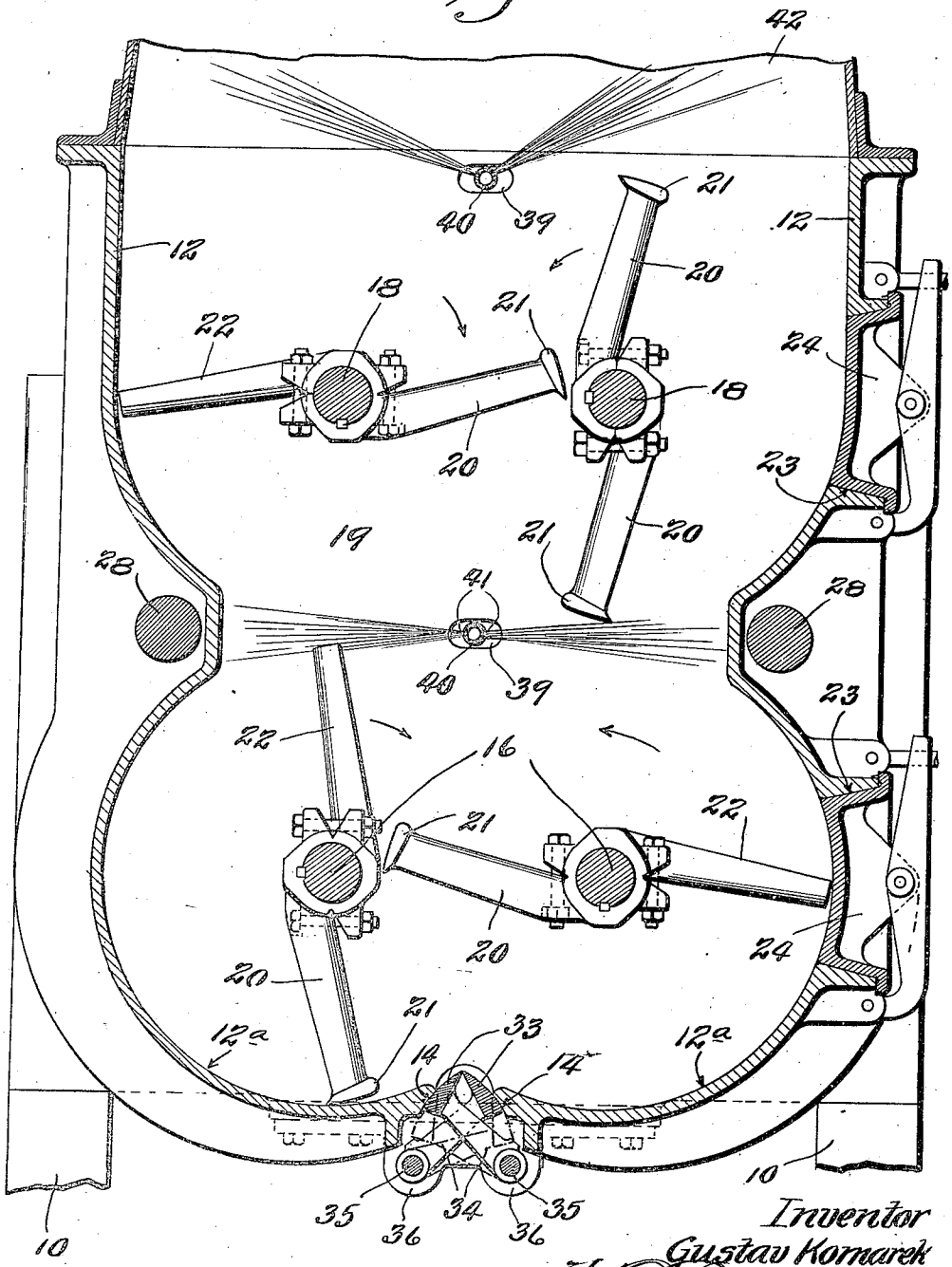
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3 SHEETS—SHEET 3.

Fig. 3




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# UNITED STATES PATENT OFFICE.

GUSTAV KOMAREK, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO MALCOLMSON ENGINEERING AND MACHINE CORPORATION OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

## FLUXER FOR FUEL-BRIQUETTE MATERIAL.

Application filed April 1, 1919. Serial No. 286,788.

*To all whom it may concern:*

Be it known that I, GUSTAV KOMAREK, a citizen of the United States, residing at Chicago, Illinois, have invented a certain new and useful Improvement in Fluxers for Fuel-Briquette Material, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a fluxer or mechanical mixing apparatus that is particularly designed for mixing material utilized in the manufacture of fuel briquettes, the principal objects of my invention being to generally improve upon and simplify the construction of the existing types of fluxers or mixing machines; and to provide a relatively simple apparatus which can be very economically operated, which is very effective in performing its intended functions, and which can be readily combined with a briquette forming machine so as to deliver directly thereto the thoroughly mixed briquette material.

A further object of my invention is to provide what may be properly termed a "two-stage" fluxer or mixing machine, inasmuch as the apparatus is provided with two chambers, preferably disposed one above the other, with mechanical mixing means arranged for operation within the lower chamber and the upper chamber constituting a hopper into which the material to be mixed is fed and said material being subjected to heat and moisture, preferably in the form of steam, prior to the passage of said material into the mixing chamber. This arrangement is very economical from the standpoint of steam and power consumption and, in addition, enables the fluxing operations to be very rapidly accomplished, thereby materially reducing the time required to properly prepare the material for the briquette press or forming machine.

A further object of my invention is to provide improved means in the form of a gate or valve for controlling the feed of the mixed material from the apparatus to the briquette forming machine.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevational view of a fluxer or mixing apparatus of my improved construction, parts thereof being broken away.

Figure 2 is an elevational view looking in the direction indicated by the arrow 2, Figure 1, and with the lower portion of the apparatus in vertical section.

Figure 3 is an enlarged vertical section taken approximately on the line 3—3 of Figure 2.

Referring by numerals to the accompanying drawings which illustrate a practical embodiment of my invention, 10 designates a supporting framework of any desired construction and which preferably includes four uprights or corner posts 11 and arranged therein is a substantially rectangular housing which includes a pair of side walls 12 and a pair of end walls 13. This housing may be of any desired construction, for instance, it may be cast in one or more parts or it may be made up of suitable frames and relatively heavy sheet metal plates. The lower portions of the side walls 12 are curved inwardly as designated by $12^a$, and the inner ends of said side walls are spaced apart to form a discharge opening 14 for the material after the same has been thoroughly mixed and made ready for delivery to the briquette forming machine.

Mounted for rotation in suitable bearings 15 formed on the lower portions of the end walls 13 is a pair of shafts 16, the ends thereof projecting beyond said end walls and arranged for rotation in suitable bearings 17 formed on the upper portions of said end walls is a second pair of shafts 18. These four shafts pass transversely through the chamber 19 formed by the walls 12 and 13 and this chamber may be properly termed the fluxing or mixing chamber inasmuch as the material while in said chamber is constantly stirred or agitated by the mixing arms carried by the shafts. These arms, designated by the numeral 20, are provided with suitable means at their inner ends

whereby they can be adjustably secured to the various shafts and their outer ends are provided with short horizontally disposed plates or fingers 21 which, while the apparatus is in operation, travel in paths immediately adjacent to the inner faces of the side walls 12.

It will be noted that one pair of the stirring arm carrying shafts is located in the upper portion of the chamber 19 and a substantial distance above the lower pair of stirring arm carrying shafts, and by virtue of this construction, a two-stage fluxer is provided for the material passing through the fluxer is first engaged and initially mixed by the upper sets of stirring arms and said material is afterwards or in the second stage subjected to the mixing action of the lower sets of stirring arms.

Carried by the outer arm 20 of each series is a scraper 22, one edge of which is adapted to bear directly against the inner face of the adjacent end wall 13 while the apparatus is in operation, thereby scraping the material from said wall and directing it inwardly toward the stirring arms.

Formed in one of the side walls 12 and preferably at points directly opposite the pairs of shafts 16 and 18 are openings 23 which give ready access to the mixing chamber 19 and the stirring and scraping members therein, and these openings are normally closed by readily removable plates or heads 24.

Journaled in suitable bearings on the frame 10 below and to one side of the housing comprising the walls 12 and 13 is a power-driven shaft 25 and carried thereby is a pinion 26 which meshes with a relatively large gear wheel 27. This gear wheel is carried by a counter shaft 28 that is journaled in suitable bearings formed on a pair of the uprights 11 and carried by the end of this last mentioned shaft opposite the end carrying the gear wheel 27 is a pinion 29. This pinion meshes with a pair of gear wheels 30, one of which is secured to one of the shafts 18 and the other being secured to one of the shafts 16.

Carried by the ends of the shafts 18 and on the opposite side of the machine from the pinion 29 and gear wheels 30 is a pair of meshing pinions 31 and arranged on the corresponding ends of the shafts 16 is a pair of meshing pinions 32.

By the arrangement of gearing just described, the rotary motion of power driven shaft 25 is transmitted through pinion 26 and gear wheel 27, to shaft 28, and from thence through pinion 29, gear wheels 30 and pinions 31 and 32 to the pairs of shafts 16 and 18 and which latter carry the stirring and scraping arms 20 and 22. The discharge of mixed material through the opening 14 is controlled by a pair of gates or plates 33, the same being arranged to move toward and away from each other inasmuch as they are carried by short arms 34, the latter being closed and their lower ends mounted on a pair of shafts 35. These shafts are journaled for rotation in suitable bearings 36 which depend from the end walls 13 of the housing and carried by said shafts are meshing pinions 37 which are effective in causing said shafts and the gates carried thereby to move uniformly and simultaneously. One of these shafts 35 is extended a suitable distance away from the housing and carried by said extended end is a lever 38 or other member which may be manually engaged to impart rocking movement to the shaft.

Formed in the end walls 13 near the central and top portions thereof are openings 39 through which extend steam pipes 40 and formed in the latter within the chamber 19 are jet openings 41, the same being disposed so as to direct jets of steam outwardly through the central and upper portion of the mixing chamber. These pipes are connected to a suitable source of steam supply.

Arranged on top of the housing comprising the walls 12 and 13 are the lower ends of the walls of a hopper 42, the same being of any desired construction and of such size as to contain a substantial amount of briquetting material. The walls of this hopper are preferably inclined so that the chamber within the hopper gradually becomes larger toward its lower end, this arrangement being carried out in order to reduce the friction of the material or mixture against the sides of the hopper and to insure an even and uniform downward travel or feed of material through said hopper.

In the operation of my improved fluxer, the mixing chamber 19 and hopper 42 are charged or filled with briquetting material and the power shaft 25 is now operated to effect rotary movement of the shafts 16 and 18. Owing to the gear connections between the members of these pairs of shafts, the members of each pair will rotate toward each other, as illustrated by the arrows in Figure 3, and as the mixing arms travel in circular paths which overlap each other, the entire body of material within the mixing chamber 19 will be constantly agitated and which action will result in a rapid and thorough mixture of the elements constituting the material. As this mixing operation is carried out, steam is delivered to the pipes 40 and will discharge therefrom through the jet openings 41 to simultaneously heat and moisten the material under treatment.

Inasmuch as the steam pipes extend entirely through the mixing or fluxing chamber, the steam discharging from said pipes is delivered directly into the volume of material under treatment, with the result that

all of the moisture and heat will be absorbed by said material.

In the event that there is an excess of steam discharged from the pipes 40, said steam will rise through the body of material in the upper portion of the mixing chamber and pass upwardly through the unmixed material in hopper 42. Thus the unmixed material or that material within hopper 42 is to a certain degree pre-heated and moistened, with the result that when it reaches the mixing chamber 19, it is with the least expenditure of power brought into the proper consistency to produce the strongest and most homogenous briquettes.

While the machine is in operation, it is desirable that a relatively large volume of raw material be maintained within the hopper 42 and that a sufficient amount of steam be delivered to pipes 40 or to the upper one of said pipes to effect a partial heating and moistening of the material within said hopper. This procedure results in a material saving of time, labor and consequent expense in properly preparing the material for the briquette press or machine, for it will be understood that to pre-heat and moisten the raw material, the latter can be very rapidly and effectively brought to proper condition while under treatment in the mixing chamber 19.

The arrangement and operation of the mixing arms is such that all power delivered to the shafts carrying said mixing arms is utilized in the actual work of mixing or fluxing the material and rendering the same to proper consistency for delivery to the briquette press.

Inasmuch as there are two sets of stirring arms and one set is disposed above the other, the entire body of material within the mixing chamber is constantly stirred and agitated, and which action quickly brings the material into proper condition to be delivered to the briquette forming machine.

To effect a discharge of the material from the fluxing apparatus to the briquette machine, it is only necessary to actuate hand lever 38 to rock the shaft to which said lever is connected, and such action simultaneously rocks the other one of said shafts 35, and as a result, the plates or gates 33 are moved outwardly and downwardly away from each other to partially open the discharge outlet. When a sufficient amount of material has discharged through the opening between the gates or plates 33, a reverse movement of the handle 38 closes said gates.

A fluxer of my improved construction is comparatively simple, is very efficient and economical in operation, and is effective in very rapidly preparing briquette machine for delivery to a briquette forming press or machine.

It will be readily understood that minor changes in the size, form and construction of the various parts of my improved fluxer can be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I do not in this application claim a method of treating fuel for briquetting purposes, as the same is disclosed in an application filed by me December 21, 1920, No. 434,342.

I claim:

1. An apparatus of the character described comprising an unobstructed tapered chamber, widest at its lower end, means for agitating material adjacent to the lower end of said chamber, and means for controlling the discharge of the material from the bottom of said chamber.

2. An apparatus of the character described comprising an unobstructed tapered cylinder and provided at its upper end with an inlet opening, means for agitating material in the bottom of said chamber, means for controlling the discharge of the material from the bottom of said chamber, and means for introducing heat to the chamber.

3. An apparatus of the character described comprising an upwardly tapered chamber substantially unobstructed through its interior and provided at its upper end with an inlet opening, means for agitating the material near the bottom of said chamber only, means for controlling the discharge of the material from the bottom of said chamber, and means for introducing heat and moisture into the chamber near its bottom.

4. The combination of a tapered chamber the interior of which is unobstructed and is largest at its bottom for carrying a column of material or mixture, and means for mechanically agitating or kneading the mixture at the bottom of the tapered chamber, whereby the full weight of the unobstructed column of mixture is allowed to bear down on that portion of the mixture which is receiving mechanical treatment.

5. The combination of a tapered chamber the interior of which is unobstructed and is largest at the bottom end, means for heat treating the mixture column, which fills the cylinder, to nearly its full height, and means for intensely working or kneading the mixture at the lower or bottom while the upper portion, or that part of the mixture above the agitating arms is not disturbed by the mechanical action but is heat treated and gradually fed downward under substantial pressure as it is being heat treated.

6. The combination of a tapered chamber the interior of which is unobstructed and is largest at its bottom for carrying a column of mixture approximately its full height, means for intensely working or kneading

this material column at the bottom end of the chamber only, and means for introducing heat into that portion of the mixture column which has not yet come in contact with the mechanical working or kneading means.

7. The combination of a vertically disposed upwardly tapered chamber having an unobstructed interior, means for feeding material into the upper portion thereof, means for mechanically working or kneading the material at the bottom of said chamber, and means for heat treating the material as it travels downwardly through the cylinder.

In testimony whereof I hereunto affix my signature this 28th day of March, 1919.

GUSTAV KOMAREK.