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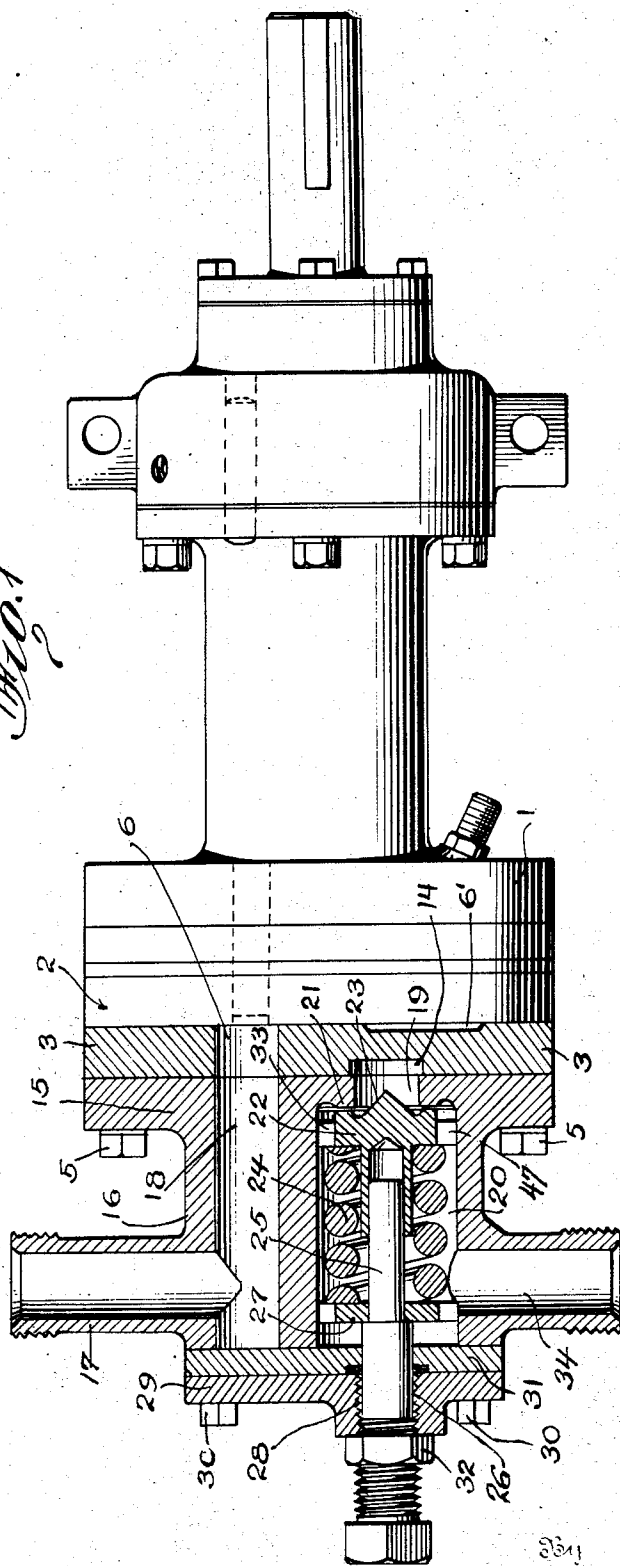
J. MARCO

2,302,705

HOMOGENIZER

Filed July 29, 1939

3 Sheets-Sheet 1



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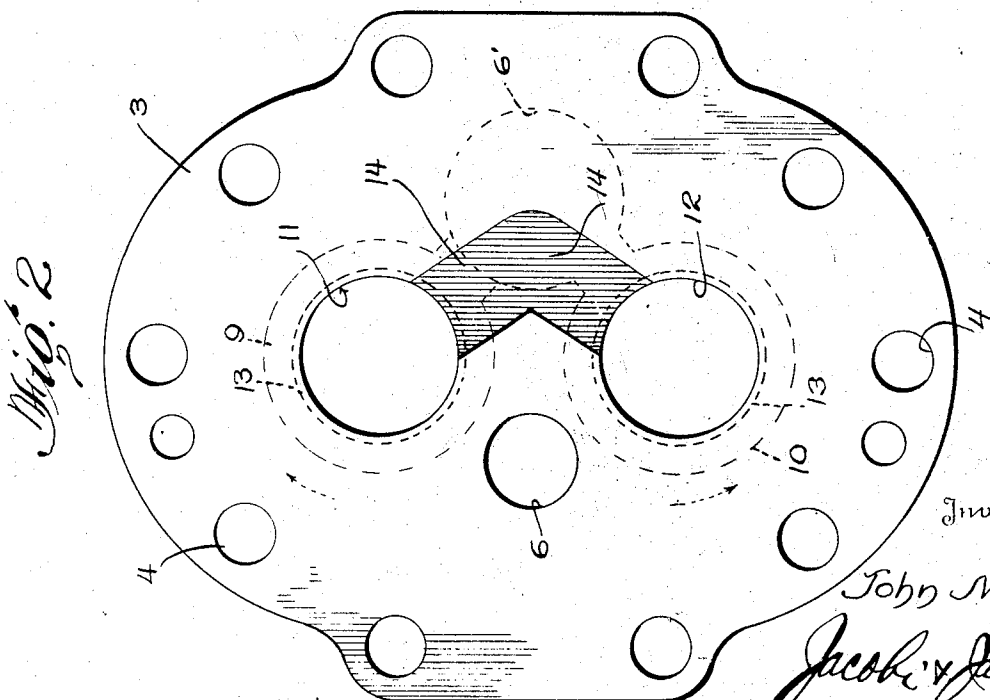
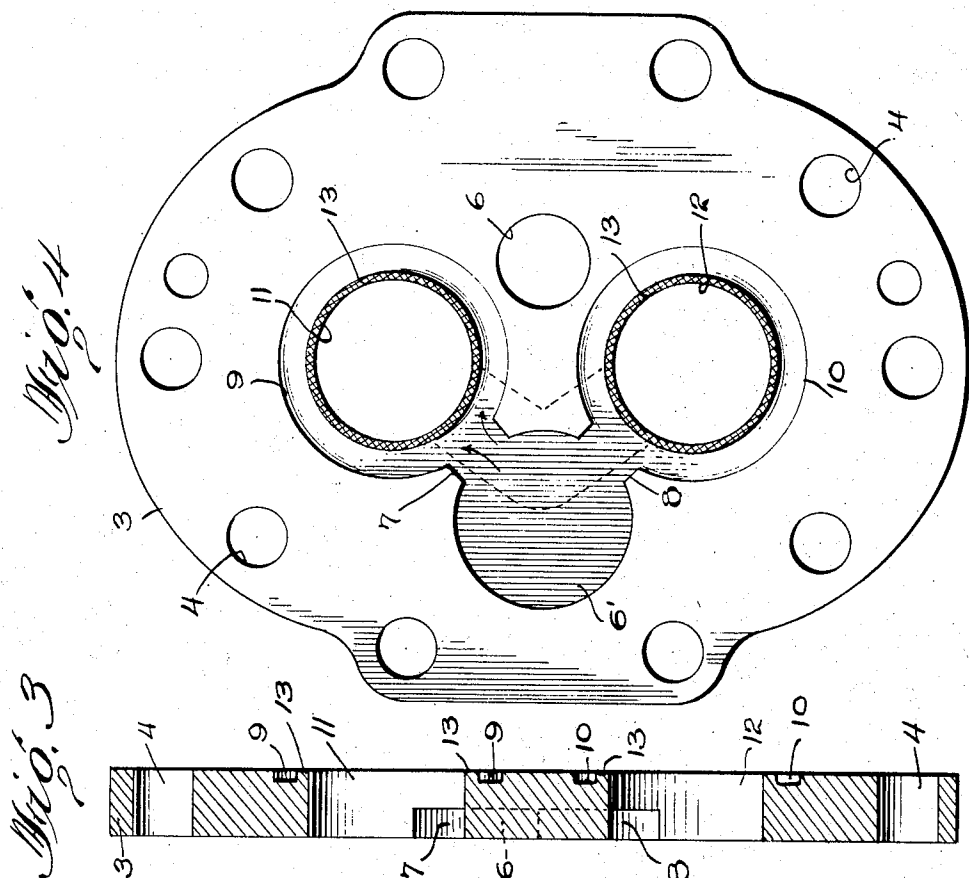
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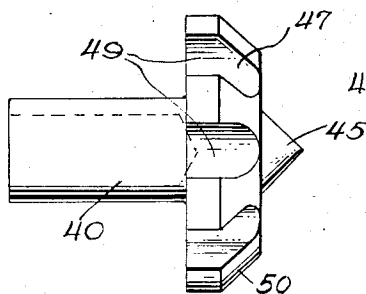
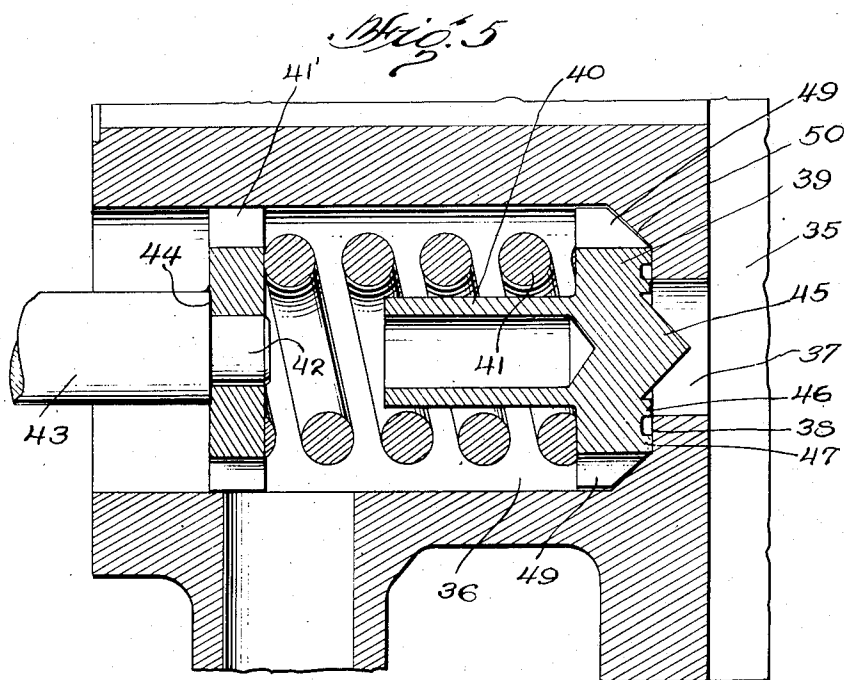


Fig. 6

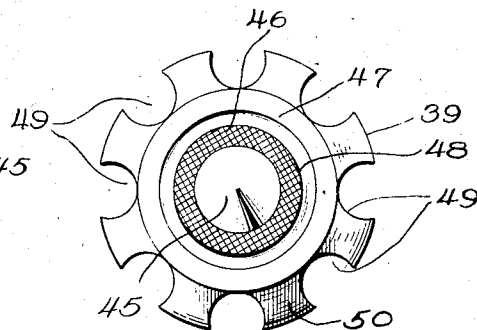


Fig. 7

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UNITED STATES PATENT OFFICE

2,302,705

HOMOGENIZER

John Marco, Philadelphia, Pa., assignor to Marco Company, Inc., Philadelphia, Pa., a corporation of Pennsylvania

Application, July 29, 1939, Serial No. 287,423

1 Claim. (Cl. 99—265)

This invention relates to an improved homogenizer and more particularly to improvements in homogenizer structures as illustrated in my copending application Serial No. 235,509, the same being interchangeable with parts illustrated in the latter application, the present invention contemplating use and association with the pump structure covered in the application aforesaid.

The principal object of this invention is to provide means for effecting a preliminary stage of homogenization, preparatory to a pressure stage of homogenization, for use particularly in the homogenization of milk to further reduce the curd tension therein.

Still another object of the invention resides in the production of an emulsifier or homogenizer head plate adapted for inter-position between a pump structure in which pressures are built up, as best disclosed in a copending application, and a specific homogenizer operated under pressure of the materials fed thereto.

A still further object of the invention resides in providing a simple and efficient structure which is capable of interchange with parts and elements of a known machine, as illustrated in my copending application Serial No. 235,509, aforesaid.

Still another object of the invention resides in providing an homogenizer structure which is simple and durable in construction, comparatively inexpensive to manufacture, and one which will be capable of ready assembly or disassembly for cleansing or interchange of parts and, therefore, extremely efficient in use.

With these and numerous other objects in view, my invention consists in the novel features of construction, combination and arrangement of parts, as will be hereinafter referred to and more particularly pointed out in the specification and claim.

In the accompanying drawings, forming a part of this application,

Figure 1 is a side elevation, partly in section, illustrating my improved homogenizer and homogenizer or emulsifier head plate arranged or coupled with a pump structure.

Figure 2 is a front elevation of my improved homogenizer or emulsifier head plate,

Figure 3 is a vertical section therethrough,

Figure 4 is a rear elevation of said homogenizer head plate,

Figure 5 is a vertical section through a slightly modified form of homogenizer structure,

Figure 6 is an elevation of the homogenizer valve as shown in Figure 5, and

Figure 7 is a front elevation of said valve.

My improved homogenizer structure is, as aforesaid, capable of application to a known pump and homogenizer structure now successfully marketed and particularly illustrated in my copending application Serial No. 235,509. The machine in its entirety is capable of use in the homogenization of various materials including foods, chemicals, medicines, pharmaceutical preparations, minerals, oils and greases, paints and varnishes, detergents and numerous other products and materials. Various types of homogenizers, per se, are utilized in the machine, according to the materials being treated and the results desired. In the processing or homogenizing of milk, for which my apparatus is particularly well adapted, reduction of curd tension is an important factor. My particular invention herein, insofar as the homogenizer plate is concerned, is particularly well adapted for the treatment of milk for the reduction of this curd tension, in that a preliminary or additional stage of homogenization is effected prior to the treatment of the milk by the pressure stage of homogenization, it being understood, of course, that the homogenizer structure is used in association with a specific type of pump structure, as aforesaid. It may well be, however, that this particular type of homogenizer structure is equally well capable of being used effectively in the treatment of other materials than milk. It will be understood, however, that this particular structure is capable of interchange with various types of homogenizing structures and devices for use with my improved pump structure, as aforesaid, in accordance with the materials treated and the results desired.

In describing my improved homogenizer structure, I shall refer to the drawings in which similar reference characters designate corresponding parts throughout the several views, and in which 1 designates generally a pump structure, of the type illustrated in my copending applications, the same involving the use of rotors which build up pressures within the housing 2 of the material being treated. Applied to the outer face of the rotor housing 2 of the pump 1 is my improved homogenizer head plate 3 which is of a shape to conform to the shape of the housing and provided adjacent its peripheral edge with openings 4 through which stud bolts 5 are projected to secure said plate, together with other elements to be hereinafter described, to the pump structure.

The plate 3 is provided with an inlet opening 6, through which the material to be treated is fed

to the rotor (not shown) within the rotor housing 2. This material treated by the rotor is carried around under pressure within the rotor housing and against the rear face of the plate 3 and delivered into a substantially circular pocket or recess 6' formed in the rear face of the plate 3 midway of the upper and lower ends thereof and to one side of the median line there-through, as particularly shown in Figure 4 of the drawings. The material after entering the pocket or recess 6' is forced under pressure through two diagonal channels 7 and 8 from the pocket or recess 6' into the annular channels 9 and 10 respectively, communicating with said channels 7 and 8. These channels 7, 8, 9 and 10 are likewise merely formed on the rear face of the plate 3, as shown in Figure 4, and said channels 9 and 10 respectively surround outlet openings 11 and 12. However, between said channels 9 and 10 and the respective openings 11 and 12, there is provided for each outlet opening an annular rib 13, the outer peripheral edge of which is provided with a series of millings which are fabricated so that they intersect one another. As the material treated is forced through the channels 7 and 8 and around through the channels 9 and 10, the material is forced under pressure over the ribs 13 into the respective outlet openings 11 and 12. The particular type of millings provided created two opposing forces or flows of material striking one another under pressure. This forms one stage of emulsification of the material so treated. After the material treated passes through the outlet openings 11 and 12 to the outer side of the homogenizer plate 3, this material is conducted through the V-shaped channel 14 which is formed only on the outer side of said plate 3, as shown in Figure 2 of the drawings. From this point, the material so treated is conducted to the inlet port of the homogenizer per se, as will be hereinafter and more particularly set forth.

Secured to the outer face of the homogenizer head plate 3 is the inner plate section of the homogenizer housing 15. This housing 15 has a tubular portion 16 from which leads the inlet port 17 through which the material to be treated is fed to the machine. The material entering through the port 17 is fed through the longitudinal channel 18 which communicates, as shown in Figure 1 of the drawings, with the inlet or intake opening 6 of the homogenizer head plate.

After the material is treated and passed through the homogenizer head plate, it passes through the channel 14 to the inlet opening 19 formed in the rear face of the housing 15 leading directly to the homogenizer. This housing 15 is formed with a homogenizing chamber 20 and the inlet opening 19 being restricted in diameter, a valve seat 21 is formed on the inner wall of the rear end of the chamber 20. Adapted to abut and be seated on said seat 21 is the homogenizer valve 22 which has a conical nose piece 23 thereon extending through the opening 19. The valve 22 is provided with a tubular extension which supports thereon a coil spring 24 while a guide pin 25 extends through said tubular portion to align the head of the valve with respect to the seat. This guide pin 25 is formed on the end of a threaded bolt 26, the pin proper being of slightly reduced diameter to provide a shoulder to support thereagainst a spring retainer 27. The threaded portion of the bolt 26 engages the internally threaded portion 28 of the outer cover plate 29,

the latter being held to the outer end of the homogenizer housing through the medium of the studs 30. Interposed between the plate 29 and the housing is the seal plate 31 and a lock nut 32 is engaged with the threaded portion of the bolt 26 to lock the coil spring in any adjusted position under tension against the valve.

The head of the valve 22 from its peripheral edge inwardly is provided with a plurality of spaced cutout portions 33 so that as the material passes through the opening 19 and between the valve head and its seat, the same may pass onward through the chamber 20 through these cut-out portions and be exhausted through the outlet port 34. It will be seen that as this material enters the opening 19, it is caused to travel over the conical portion 23 of the valve head. This in itself constitutes a stage of homogenization. Then the material is forced under pressure against the tension of the spring-held valve head through the space between the seat and the valve which, obviously causes an effective homogenization of the material. The tension of the spring holding the valve against its seat may be adjusted as desired by adjusting the bolt 26, as aforesaid. Thus, it will be seen that the material treated through this apparatus will not only find a stage of homogenization through the rotary pump structure but will find a preliminary stage of homogenization through the treatment of the material as it passes the homogenizer head plate preparatory to being actually and completely homogenized or emulsified by the homogenizer proper.

In Figures 5, 6 and 7, I have shown a slightly modified form of homogenizer. The homogenizer housing represented by the numeral 35 is provided with an homogenizer chamber 36, the entrance to which is gained through a restricted inlet opening 37. This provides a seat 38 within the housing against which is adapted to be abutted the homogenizer valve 39. This homogenizer valve also has a tubular extension 40 thereon which acts as a support or guide for the coil spring 41 tending to normally retain the head of the valve against the seat 38. The opposite end of the spring is retained by the retainer plate 41' which is connected with the pin 42 carried on the end of a guide arm 43, the pin being reduced in diameter to form a shoulder 44 abutting the outer face of the retainer plate 41'. The outer or effective face of the head of the valve is conically shaped as shown at 45, the cone design leading to a knurled or milled rib 46. Spaced from the rib 46 which is annular, is an annular flat faced rib 47, there being a groove 48 between the annular ribs 46 and 47. Thus, as the material enters the opening 37 under pressure, it is caused to travel over the conical face 45 of the valve and before entering the chamber 36 must pass over the milled rib 46, through the channel 48 and over the rib 47, all of which creates effective homogenization of said material. In order to pass from the valve head into the chamber 36, said head from its peripheral edge inwardly in spaced relation is cut out as shown at 49, the front face of the portion of the valve head where the cutout portions are formed, being beveled as shown at 50 to coincide with a similar beveling of the inner wall of the chamber at that point. This is one modified form of homogenizer, but it will be understood that various types of homogenizers may be used, such as illustrated in my copending application, Serial No. 235,509.

From the foregoing description of the construction of my improved homogenizer and homogenizing or emulsifying head plate, it will be seen that I have provided a comparatively simple, inexpensive and efficient means for carrying out the objects of the invention and the operation thereof will be readily understood.

While I have described the elements best adapted to perform the functions set forth, it will be understood that various changes in form, proportion and in the minor details of construction may be resorted to, without departing from the spirit or sacrificing any of the principles of the invention.

Having thus described my invention, what I claim is:

A head plate for homogenizers adapted to be mounted between a pressure pump and a homogenizer housing and constitute means for effecting a preliminary homogenizing of material to the inlet of the homogenizer housing, said head plate comprising a flat body having front and rear faces confronting the homogenizing housing

and pump respectively, the plate being formed with ports spaced from each other transversely thereof for flow of material from the pump towards the homogenizing housing and between upper portions of the ports being formed with an opening for flow of material into the inlet of the pump, the rear face of said plate being formed between lower portions of the ports with a pocket for registering with the outlet of the pump and channels extending upwardly from the pocket and terminating in annular channels surrounding the ports in spaced relation thereto, portions of the rear face about the ports and surrounded by the annular channels being formed with a multiplicity of fine grooves through which material passes to reach the ports, and the front face of the plate being formed with a V-shaped channel between lower portions of the ports having its lower portion positioned to register with the inlet of the homogenizing housing and upper ends of its arms communicating with lower portions of the ports.

JOHN MARCO.