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R. S. WOODWARD, JR.

PROCESS OF EXTRACTING OIL FROM OLEAGINOUS SEEDS.

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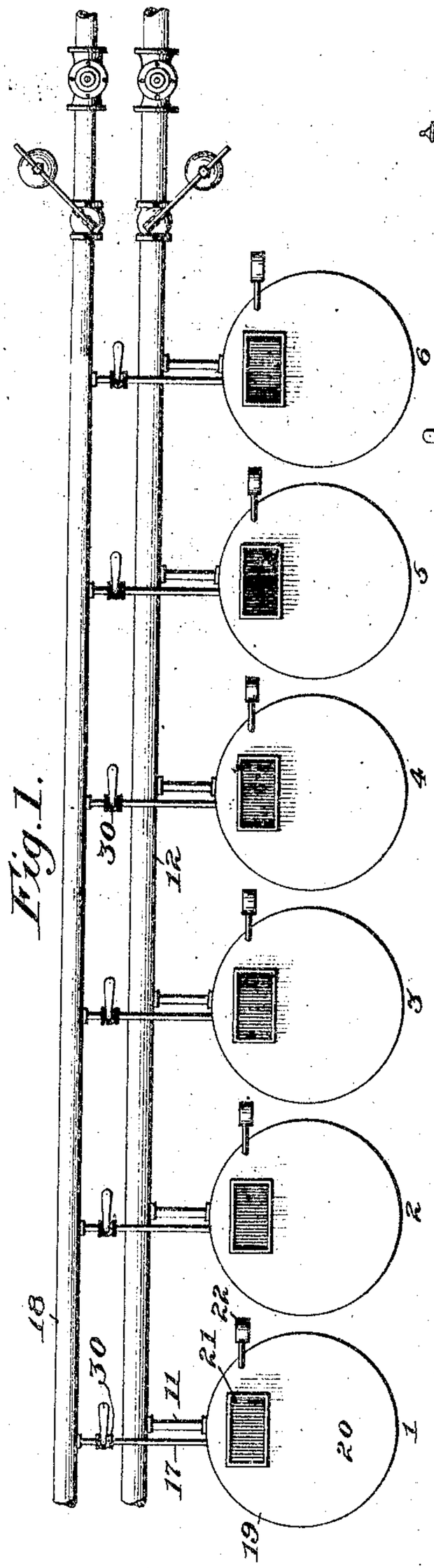

Fig. 1.

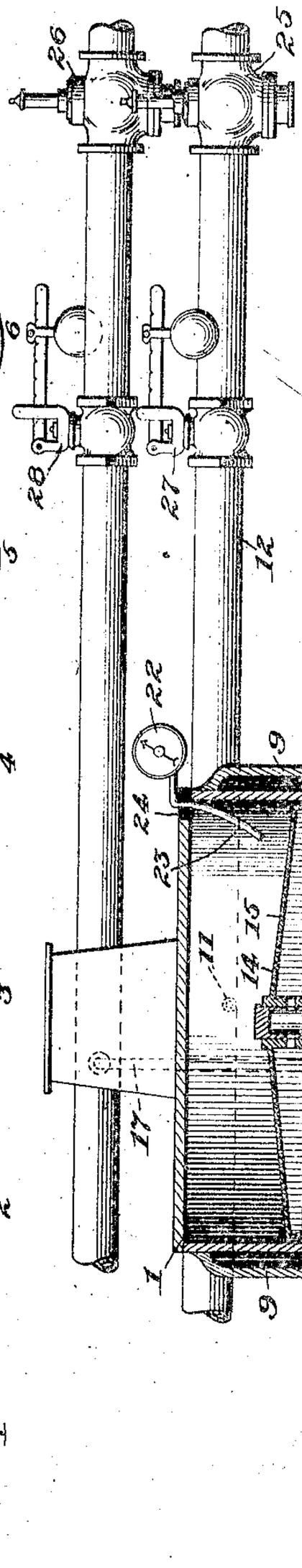

Fig. 2.

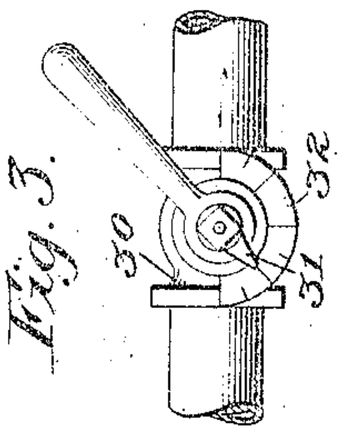

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

ROBERT S. WOODWARD, JR., OF NEW YORK, N. Y.

PROCESS OF EXTRACTING OIL FROM OLEAGINOUS SEEDS.

No. 843,983. Specification of Letters Patent. Patented Feb. 12, 1907.

Application filed June 16, 1906. Serial No. 321,985.

To all whom it may concern:

Be it known that I, ROBERT S. WOODWARD, Jr., a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Processes of Extracting Oil from Oleaginous Seeds, of which the following is a specification.

In the extraction of oil from oleaginous-seed meats, particularly cotton-seed meats, the most important and vital step is that of cooking the meats, and this step alone is the only one of the several involved which may be termed a "chemical" step, the remaining being entirely mechanical. Upon the proper cooking of the meats is dependent both the quality and quantity of the yield of oil therefrom, and unless due regard is had to what may be considered the three essential elements involved therein, as hereinafter set forth, it becomes impossible to operate upon successive batches of meats in the uniform manner which is essential in order to obtain a maximum yield of oil therefrom, as above noted.

Heretofore in the cooking of the meats it has been impossible to even approximate a maximum yield of oil of uniform quality therefrom, because of the absence of an economical and scientific method of maintaining the essential elements of the process uniform under the varying conditions encountered in actual operation.

My invention relates to the process of extracting cotton-oil from the so-called "meats," in which the essential elements involved in the step of cooking—namely, the humidity, the temperature, and the time—are accurately controlled according to a prearranged schedule and not in the hit-or-miss fashion in vogue at the present time.

An apparatus in which my process may be successfully carried out is illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a plan view of my apparatus. Fig. 2 is a front sectional elevation of a single heater, together with an elevation of the steam-mains and valves thereof. Fig. 3 is a detail plan view of a graduated stop-valve with a fragmentary view of the steam-main. Fig. 4 is a detail elevation, partly broken away, of a modification in which the superheated steam-main consists of a steam-coil included within a larger steam-main.

In the drawings the reference-numerals 1, 2, 3, 4, 5, and 6 designate a battery of similar heaters. The heater 1, which is typical of the series, is supported upon standards 7 and 8 and provided with communicating steam-jacketed walls and bottom 9 and 10, which jackets are connected by a pipe 11 with a steam-main 12 and provided with an exhaust-pipe 13. A hollow stirrer 14, the upper surface of which is provided with perforations 15, is mounted upon a rotatable shaft 16, through which it is connected, by means of a pipe 17, (connection not shown,) to a steam-main 18, whereby an even distribution of moisture throughout the contents of the heater can be accomplished. The top 19 of the heater is provided with a hinged portion 20. A feed-hopper 21 is provided with closure-slides, (not shown,) as is customary in the art.

A thermometer 22 is removably mounted on the top of the heater, and the leg 23 is insulated therefrom by a non-heat-conducting packing 24. The steam-mains 12 and 18 are each provided with reducing-valves 25 and 26 and safety-valves 27 and 28 intermediate the said reducing-valves and the heater. The direct-steam-supply pipe 17 is provided with a graduated stop-valve 30.

A pointer 31 is arranged to traverse the face of an opposing dial 32 and is adapted to be locked in any desired position, whereby predetermined amounts of steam can be introduced during any given period of cooking.

I have discovered that the so-called "balling" of the meats can be prevented if the direct steam is superheated prior to its introduction and thoroughly disseminated through the mass. This of course may be accomplished either by providing a separate superheated steam-main corresponding in size to the indirect steam-main 12 or by a relatively small steam-main consisting of a steam-coil within the main 12, into which steam under reduced pressure relative to the steam-pressure of the main 12 is conducted.

The form of graduated stop-cock which I preferably use is the type now extensively used in gas-engines to throttle the supply of gas to the mixing-chamber.

The exact regulation of the pressure of the steam supplied from main 17 as direct steam and also to the jackets 9 and 10 from the main 12 is accomplished by means of the reducing-valves 25 and 26, which maintain the supply of the steam at definite pressures.

Preferably, also, I provide safety-valves as additional security against irregular pressures of the steam supplied to the graduated stop-valves and to the jackets of the heater, respectively.

By the adoption of the above means for regulating the supply of pressure of the steam it becomes possible, as hereinafter described, to utilize the thermometer as an indicator of any variations in the original moisture content of the successive batches of fresh meats supplied to the heaters.

The operation known as "cooking" the meats as preferably carried out according to my invention is as follows: The fresh—*i. e.*, air-dried—meats are first introduced into the heater and the cover placed thereon. The operator or cook then sets the various controls according to a schedule or table prepared as follows: An analysis of the moisture content of the meats in a heater immediately at the termination of the cooking period of all successfully-cooked batches of meats under the present methods of operation will show a certain fixed moisture content. In the case of an unsuccessfully-cooked batch of meats a similar analysis will show a moisture content at wide variance from the above, since upon the requisite amount of moisture supplied throughout the cooking is dependent the temperature of the meats, and therefore the extent of coagulation of the albumen thereof and the limpidity of the oil resulting therefrom. The moisture content of the fresh meats having been determined by analysis, it is evident the graduated stop-valve must be set to supply during the cooking period, which is an arbitrary period usually between seventeen and twenty-five minutes, an amount of moisture equal to the difference between the desired moisture content of the meats at the termination of the cooking period and the original moisture content thereof. The temperature of the steam supplied to the jackets is preferably that of steam at forty pounds pressure, although various degrees of temperature may be used provided the particular one chosen is maintained constant. The stop-valve is empirically graduated, and preferably it is in degrees which directly indicate in percentages an amount of steam supplied during the period equal to the difference between the desired moisture content at the termination of the cooking period and the water content of the fresh meats. Such a table embodying the above data may be represented as follows:

Water content of fresh meats.	Time.	Pressure of jacket-steam.	Stop-valve pointer.
11%	17	40 lbs.	6°

In the above table it is evident that the moisture content at the end of the seventeen-minute period will equal seventeen per cent.—*i. e.*, eleven per cent. plus six per cent.

The controls being set as indicated above and the cooking period having been commenced, the points of the thermometer will gradually soar from 60° until it reaches a certain maximum of about 215° Fahrenheit, and this movement will occupy a given time provided the conditions remain the same. If, however, a subsequent batch of fresh meats whose moisture content is unknown has a greater moisture content than the batch having a known moisture content and according to which the controls were set, the pointer of the thermometer will lag and fail to reach the maximum temperature in the same period of time as required for the former batch. This, of course, is because there is an additional amount of moisture in the vessel due to the increase in the water content of the meats introduced, and therefore the addition of an increased number of units of indirect heat would be required in order to attain the temperature of 215° Fahrenheit in the same period of time. Since the temperature of the jacket is maintained constant, any irregularity in the action of the pointer directly indicates a variation in the moisture content of the fresh batch of meats from that of a previous batch, and thereupon an analysis of the fresh meats is then made prior to the next cooking operation and the controls adjusted accordingly. Preferably the temperature of the jacket is such that the pointer will attain the maximum point—for example, 215° Fahrenheit—coincidently with the termination of the cooking period, as otherwise it is necessary to tabulate the period which elapses during the movement of the pointer from the minimum to the maximum temperatures in order that a variation in the period when operating on a successive batch of meats can be determined.

In the absence of fluctuations in the movement of the pointer of the thermometer in the treatment of these successive batches of fresh meats the controls are undisturbed, and in view of the fact that an average analysis requires at least one-half hour, whereas a period of cooking seldom exceeds twenty-five minutes, the importance of controlling the various elements involved in the cooking so that the temperature accurately indicates the fluctuations in the moisture content of successive batches is apparent.

The term "batch" as used throughout the specification relates to equal quantities of meats wherever it occurs, and the term "air-dried" implies that the meats have not been subjected to an amount of heat which will drive off appreciable amounts of the water normally present in the meats.

While this process is especially applicable to cotton-seed meats, it is evident that it is equally useful in the treatment of flax-seed

meats to obtain increased amounts of linseed-oil therefrom, and the term "oleaginous seeds" is therefore adopted in the claims as descriptive of both of the above seeds.

Having thus described my invention, what I claim is—

1. The process of cooking oleaginous-seed meats, which consists in mixing with batches of air-dried meats having a predetermined moisture content, the amount of moisture, as indicated by the predetermined moisture content of the meats, which is required to produce in said batch of meats a fixed moisture content at the termination of a fixed cooking period and simultaneously indirectly supplying to the said meats for a fixed period, a heating medium maintained at a constant temperature, whereby the treatment of a plurality of separate batches of meats is absolutely uniform and the maximum yield of oil is obtainable therefrom, substantially as described.

2. The process of cooking oleaginous-seed meats, which consists in mixing with batches of air-dried meats having a predetermined moisture content, the amount of moisture, as indicated by the predetermined moisture content of the meats, which is required to produce in said batch of meats a fixed moisture content at the termination of a fixed cooking period and indirectly supplying to the said meats for a fixed period, a heating medium maintained at a constant temperature, whereby the treatment of a plurality of separate batches of meats is absolutely uniform and the maximum yield of oil is obtainable therefrom, substantially as described.

3. The process of cooking oleaginous-seed meats, which consists in indirectly supplying to successive batches of meats during fixed periods a heating medium maintained at a constant temperature, simultaneously mixing with the meats a fixed amount of moisture, observing the time rate of increase in temperature of each batch, and regulating the amount of moisture supplied to a succeeding batch of meats upon any variation in the time rate aforesaid, said amount of moisture being determined by reference to the predetermined moisture content of the fresh meats to be treated, substantially as described.

4. In the process of cooking oleaginous-seed meats, the step which consists in intimately mixing with the meats a known quantity of superheated steam, whereby "balling" during the cooking is prevented, substantially as described.

5. In the process of cooking oleaginous-seed meats, the step which consists in intimately mixing with the meats, superheated steam, whereby "balling" during the cooking is prevented, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT S. WOODWARD, JR.

Witnesses:

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