To all whom it may concern:

Be it known that I, EUGENE RILEY EDSON, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Separating Grease from Grease-Yielding Material; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in separating grease or greasy and oily matter from raw fish and other raw material capable of yielding the same, and pertains more especially to an improved process for separating grease from material which is capable of yielding not only grease or greasy and oily matter, but which is also capable of yielding glue or gelatin.

The general object of this invention is to economically separate grease from grease-yieldable and gelatin-yieldable material by the treatment of the said material with water at a temperature low enough to effect a gelation of the grease and to avoid action upon the gelatin-yieldable substance contained in the material and to facilitate and positively effect a separation of the grease from the mass without forming an emulsion of the grease with the gelatin-yieldable substance or other matter contained in the material undergoing treatment.

With this general object in view and to the end of realizing other advantages hereinafter appearing my invention consists in the process and steps hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation, largely in section, of apparatus suitable for use in carrying out my invention. Fig. 2 is a top plan, partly in section, of the larger portion of the apparatus.

Referring to the drawings, a designates a tank or receptacle which is open at its upper end for accommodating the introduction into the receptacle of the grease-yieldable material which is to be treated. The receptacle a is provided at its lower end and centrally with a downwardly-extending tube or duct b, which communicates at its upper end with the chamber of the said receptacle and forms the outlet of the receptacle and has a normally closed valve c. The chamber of a cooling-jacket d, which surrounds the receptacle a, is adapted to receive cold brine, and a pipe e (shown only in Fig. 1) is arranged to conduct brine into the said chamber and has a normally closed valve f. A series of refrigerating coils h of a refrigerating plant is arranged within the jacket d around the receptacle a. The jacket d is provided at its lower end with a drain-pipe j, which has a normally closed valve k.

The receptacle a is provided at its upper end with an annular trough l, and m designates a pipe which has its receiving end communicating with the chamber of the said trough.

A stirring-shaft o is arranged vertically and centrally of the chamber of the receptacle a and extends from within the lower end of the said chamber upwardly and a suitable distance above the said receptacle. The shaft o is supported in any approved manner and is intergraded at its upper end, as at p, with a suitably-supported shaft r, to which power is suitably applied. The shaft o is provided within the chamber of the receptacle a and at suitable intervals vertically with laterally-projecting radially-arranged stirring-arms s, and the receptacle a is provided interiorly and at suitable intervals vertically with stationary arms t, which alternate with the arms s—that is, the arms s and t have such relative arrangement that the arms s shall during the rotation of the shaft o revolve between and in close proximity to the arms t, and consequently the said arms s and t cooperate in stirring and disintegrating the material undergoing treatment within the receptacle a.

An air-conducting pipe u communicates at its receiving end with the outlet of a suitably-operated pump w. The pipe u extends through the chamber of the cooling-jacket d into the lower portion of the chamber of the receptacle a, wherein it terminates in a coil v', arranged within the lower end of the said chamber and provided with orifices x, discharging upwardly into the said chamber. It will be observed, therefore, that means for introducing cold air under pressure into the lower portion of the chamber of the receptacle a is
provided. The temperature of the cold air thus introduced is preferably about 40° Fahrenheit.

A tank \( y \) is arranged at one side of and a short distance from the apparatus already described. The tank \( y \) is supplied with cold water \( w \), and the pipe \( n \) communicates at its discharging end with the upper portion of the chamber of the said tank. A water-conducting pipe \( 5 \) discharges into the tank \( y \) and has a normally closed valve \( 6 \). A grease-conducting chute \( 7 \) is in open relation with the upper end of the chamber of the tank \( y \) and has a normally closed valve \( 8 \). In Fig. 1 a body of grease or grease-containing liquid \( c \) is shown floating on the body of water \( w \). The tank \( y \) is provided at its lower end with a water-discharge pipe \( 10 \), which connects with the receiving-inlet of a suitably-operated pump \( 13 \), whose outlet communicates with a pipe \( 13 \), which discharges into the lower end of the chamber of the receptacle \( a \) and has a normally closed valve \( 14 \).

The operation of the apparatus and the meritorious steps resulting therefrom are as follows: The chamber of the cooling-jacket is supplied with brine, and a circulation of the cooling or refrigerating agent through the series of coils \( b \) is established, so as to result in cooling the receptacle \( a \) and any material supplied to the said receptacle. The material to be treated is introduced into the chamber of the receptacle \( a \) with enough water to float on top of the mass any grease or greasy and oily matter separated from the material during its treatment within the said receptacle. The mass introduced into the receptacle \( a \) is preferably about half water and half grease-yielding material and has been sliced or cut into small pieces. Preferably the receptacle \( a \) is filled with grease-yielding material and water to near the top of the trough \( l \). The temperature of the said mass is preferably maintained at about 40° Fahrenheit during the treatment of the material—that is, the material is treated with water within the receptacle \( a \) at a temperature high enough to prevent freezing of the mass and low enough to congeal the grease or oily and greasy material contained in the material without resulting in any action upon the gelatin-yieldable substance which may be contained in the material, so that the formation of an emulsion of the grease with the gelatin-yieldable substance or other substances or matter contained in the mass is avoided, and the congealed grease readily rises through the cold water of the mass to the top of the mass, where it is skimmed off or conducted into the trough \( l \) and passes from the said trough through the pipe \( m \) into the tank \( y \), wherein it floats upon the body of water within the said tank, whence it can be conducted through the chute \( 7 \) upon opening the valve \( 8 \) when the level of the body of water and floating grease within the said tank rises opposite to the receiving end of the said pipe.

The grease-yieldable material introduced into the receptacle \( a \) for treatment is cut into small pieces, as already indicated, preparatory to the introduction of the material into the said receptacle, so that the grease shall be readily liberated at the aforesaid comparatively low temperature, and the shaft \( o \) is operated during the treatment of the material, and the revolving shaft-arms \( s \) cooperate with the stationary arms \( i \) in stirring and further breaking or disintegrating the material, so as to facilitate the passage of the grease from the material and permit the same to rise to the top of the mass. Not unimportant in stirring and facilitating the liberation and rising of the grease is the introduction of cold air into different portions of the lower end of the chamber of the receptacle \( a \) during the operation of the pump \( m \), which is operated during the treatment of the material. Of course the greasy or oily matter will congeal or tend to congeal at a temperature of 40° Fahrenheit; but the congealed matter will readily break away or separate from the material undergoing treatment and will rise to the top of the mass, and the stirring of the mass and the introduction of air under pressure into the mass will positively liberate the completely-congealed grease or oily matter from the material and permit it to rise to the top of the mass, where the said grease and oily matter being lighter than the water floats on top of the mass and thence passes into the trough \( l \). Of considerable value is the pumping of water from the tank \( y \) into the receptacle \( a \), so as to cause the level of the mass within the said receptacle to rise and result in the overflowing of water and grease from the top of the mass into the trough \( l \), whence the said grease and accompanying water pass through the pipe \( m \) into the tank \( y \), and the pump \( 12 \) is operated continuously during the treatment of the material, so as to establish a circulation of water through the mass, which circulation participates in stirring the mass and is instrumental in the liberation of grease and in facilitating the passage of the grease to the top of the mass, and enough water is continually pumped into the receptacle \( a \) during the operation of the apparatus to effect an overflow of water from the said receptacle into the trough \( l \), and obviously the overflow of water into the said trough will carry with it greasy and oily matter which has risen to the top of the mass. The passage of the grease which has risen to the top of the mass may be facilitated by skimming the said grease into the said trough. The residue remaining within the receptacle \( a \) when all of the grease has been separated from the material can be conducted off through the tube or duct \( b \) upon opening the valve \( c \), and the removed residue can be treated in any approved manner to obtain glue or gelatin. Suitable means for skimming the risen congealed grease from the top of the mass into the trough \( l \) comprises a
suitably-supported tubular shaft 15, which is provided within the upper end of the chamber of the receptacle 1 with a laterally-projecting skimming-arm 16, which extends over and into the trough 1 and has a flange 17, which extends from end to end of the arm along the lower edge of the arm and projects in the direction in which the said arm revolves during the operation of the said shaft. Fig. 2 shows the arm 15 shifted somewhat relative to the position it occupies in Fig. 1 to avoid confusion of lines in Fig. 2. The shaft 15 is inter geared, as at 18, with a suitably-supported shaft 20, to which power is applied in any approved manner.

The shaft 15 is rotated in the direction in which the flange 17 of the skimming-arm 16 projects.

What I claim is:

1. An improvement in separating grease or greasy or oily matter from raw fish and other material capable of yielding such matter, consisting in treating the material in a receptacle, which is surrounded by a cooling-jacket, with water at a temperature low enough to effect a congelation of grease; permitting and effecting a rising of the congealed grease to the top of the mass, and running enough water into the receptacle to effect an overflow of the risen grease or greasy and oily matter from the top of the mass.

2. An improvement in separating grease or greasy and oily matter from fish and other grease-yielding material, consisting in treating the material in a receptacle with water at a temperature low enough to effect a congelation of the grease; effecting a liberation of the congealed grease and permitting and facilitating a rising of the said congealed matter to the top of the mass; conducting the risen congealed grease from the top of the mass in the aforesaid receptacle into a water-containing tank, and conducting enough water from the said tank into the first-mentioned receptacle to effect an overflow of grease from the said receptacle.

3. An improvement in separating grease or greasy and oily matter from fish and other grease-yielding material, consisting in treating the material in a receptacle with water at a temperature low enough to effect a congelation of the grease; stirring and disintegrating the material during the treatment so as to effect a liberation of congealed matter and to permit the said congealed matter to rise, and then separating the risen congealed matter from the mass.

4. An improvement in separating grease or greasy and oily matter from fish and other material capable of yielding such matter, consisting in treating the material in a receptacle with cold water at a temperature of about 40° Fahrenheit and thereby effecting a congelation of grease; disintegrating the material during its treatment so as to effect a liberation of the congealed grease and to permit the said grease to rise to the top of the mass, and then separating the risen congealed grease from the mass.

5. An improvement in separating grease or greasy and oily matter from fish and other material capable of yielding such matter, consisting in treating the material in a receptacle at a temperature low enough to effect a congelation of the grease; disintegrating the material during its treatment; introducing air under pressure into the lower portion of the mass during the treatment of the material, and separating the risen congealed matter from the mass.

6. An improvement in separating grease or greasy and oily matter from fish and other grease-yielding material, consisting in treating the material in a receptacle with water at a temperature low enough to effect a congelation of the grease or greasy and oily matter; stirring and disintegrating the material; introducing air under pressure into the lower portion of the mass and pumping enough water into the lower portion of the aforesaid receptacle to effect an overflow of water and accompanying grease or greasy and oily matter from the top of the mass.

In testimony whereof I sign the foregoing specification, in the presence of two witnesses, this 22d day of May, 1902, at Cleveland, Ohio.

EUGENE RILEY EDSON.

Witnesses:
C. H. DORER,
TELSA SCHWARTZ.