This invention pertains to pellet making machines, and relates more particularly to machines of that character wherein the material is initially compressed to remove the oil or other liquid therefrom. The apparatus is such that the pellet forming mechanism acts directly and continuously upon the cake as it passes from the press proper, and not only acts to recompress the cake prior to the severance of the individual pellets from the recompressed and reformed mass, but likewise induces a back pressure in the press proper with a consequent higher degree of liquid extraction from the mass being treated than would otherwise obtain.

The invention is susceptible of modification and in the drawings:—

Fig. 1 is a longitudinal vertical sectional view of a press embodying one form of my invention;

Fig. 2, an enlarged sectional view illustrating the combined final choke and pellet forming mechanism;

Fig. 3, a transverse vertical section taken on the line III—III of Fig. 2, with parts broken away;

Fig. 4, a perspective view of the combined final choke member and knife carrier;

Fig. 5, an end elevation of the pellet forming die;

Fig. 6, a vertical sectional view thereof taken on the line VI—VI of Fig. 5; and

Fig. 7, a detail sectional view illustrating a slightly modified structure.

Referring first to Figs. 1 to 5, 1 denotes the main frame or base of the press, and 2 the head end or housing in which the press actuating mechanism is mounted.

Extending outwardly of the housing and interconnected with the driving mechanism is a shaft 3, said shaft extending through the barrel of the press and denoted generally by the numeral 4. Said barrel may be of any approved type, but is preferably formed from a series of spaced bars arranged in circular series about the shaft and about a series of worms 5 and spacing collars 6.

At the intake end of the shell there is provided a feed hopper 7 and at the opposite end there is present a choke or retarding means preferably formed by a plurality of jaws 8 adjustable toward and from a sleeve 9 surrounding and keyed to the shaft 3 as are the worms and spacing collars.

The mechanism thus far described is prior art, and it acts to crush and compress material fed into the press and to express the liquid or oil content therefrom so that the cake passing from the choke is hard and has a low oil content. By adjusting the choke the degree of pressure set up within the press may be varied.

Secured to the base 1 and forming a part of the choke support and housing is a heavy casting or frame member 10 formed with a cylindrical opening 11 spaced away from a second sleeve 12 also keyed to shaft 3. Outwardly of the sleeve 12 is a spacer element 13 and then a bearing element 14 associated with and forming an element of each of a thrust bearing 15 and a radial bearing 16.

Frame member 10 is formed with a cylindrical socket outward of opening 11 in which is seated a ring-shaped die member 17 held in place by a plurality of machine screws 17a.

The inner portion of the die is formed with a series of spaced ribs alike in contour and designed to coat with a rotatable member to reform the cake as it is extruded from the press into a series of strings which are cut off by one or more knives carried by the rotatable member, thus forming pellets.

The ribs just mentioned, and denoted generally by 18, start from nothing at their innermost ends, incline inwardly toward the axis of member 17, presenting a sharp edge a, which edge terminates in a triangular space b which lies in a plane substantially parallel to the axis of the body 17. Extending rearwardly and inclining outwardly from said face b is a face c which is slightly concave to conform to a choke member presently to be described.

As will be seen, each rib is wedge-shaped in cross section, with the forward portion thereof relatively sharp as compared to the rear or outward portion where the side walls approach parallelism. The inner face of the body 17 intermediate each rib, or in other words, the faces 19, incline in a flare outwardly.
and are shown as formed on a straight line. By the arrangement thus described, there is formed a series of channels between each pair of ribs presenting a plurality of sharp or knife edges to the compacted and dry cake as it is extruded through the main choke into the space or chamber 11.

Mounted on and rotatable with sleeve 12 is a second choke which is of the form best shown in Figs. 2 and 4. It is formed as a hollow body having a cone-shaped head 20, the outer surface thereof is formed on the same angle as the rear outwardly inclined faces of the ribs 18.

At the rear of the body is a flange 21 produced by an annular channel 22 extending around the body to the rear of the head. This choke snugly fits the sleeve 12 and rotates therewith and with shaft 3, a key 23 being secured interiorly of the body and taking into a key-way formed longitudinally of the sleeve.

The forward wall 24 of channel 22 is inclined forwardly and one or more knives 25 are secured to the same and act to cut the strings of reformed and recompressed cake into pellets as the same is forced outwardly between the ribs and over the head 20, the head forming the inner wall of the channels through which the material is finally forced. Preferably the cutting edge of the knife (or knives) stands at right angles to the channels through which the strings of cake are extruded, though, of course, this is not essential.

The parts during operation normally occupy the position shown in Figs. 1 and 2, with the head 20 in close relation to the ribs. To secure and maintain the parts in such adjusted relation and to permit the recompression member to be withdrawn from the die 17, a nut 26 is mounted upon the exteriorly threaded portion of sleeve 12 and is connected by a lock ring 27 to flange 21. By this arrangement the cone 20 may be readily adjusted with reference to the removable die element 17. By employing a greater or less number of knives, the length of the pellet which is severed may be readily determined.

From an inspection of Fig. 1 it will be seen that the cake which is extruded past or through the initial choke and lies close to sleeves 9 and 12 is disrupted and forced laterally by the cone into the outwardly inclined channels formed by the ribs and rotating head where it is again compressed and passes from the machine in a dense and hard condition.

In the broader scope of the invention it is not essential that the rotatable member of the recompression and "string" producing mechanism be cone-shaped and that the other parts be made to conform thereto. Thus, in Fig. 7, the removable and replaceable die element denoted by 30 is provided interiorly with a plurality of ribs 31 which, while having their forward ends beveled and tapered, have the major portion of their inner edge parallel to the axis of the die. The rotatable cooperating member 32 while having its forward end rounded off or made tapering is generally cylindrical throughout its length and is held in position through the means above described in connection with the other form. The knife, or knives, (only one being shown) is denoted by 33 and is secured to the member 33.

From the foregoing description it will be readily appreciated that the outward choke may be withdrawn from the die and the innermost choke likewise opened up with a view of unloading the machine when it is desired to shut down operation. This enables the operator to clear out the machine, a point of manifest advantage. Otherwise the material which would be left in the apparatus would in part at least be under a high degree of compression and would become set and dry, precluding the starting up of the machine without danger of breakage.

The degree of pressure which obtains in the shell or barrel of the apparatus can, of course, be regulated by adjustment of the choke jaw 8 to obtain the desired degree of extraction, which extraction would otherwise vary from time to time according to the moisture content of the material being treated. An increase of the fibrous content of the material, which of course results in a change of density in such material, necessitates the opening up of the first choke to a greater extent to prevent plugging up of the apparatus. In other words, the first choke will be adjusted according to the nature and character of the material undergoing treatment so as to bring about the necessary and desired pressure within the press shell or body so that the cake which passes outwardly and is reformed will be of the desired and proper consistency.

What is claimed is:

1. In a pellet forming machine the combination of a press shell having draining open ends beveled and tapered, a press shell having draining open ends beveled and tapered, the major portion of their inner edge parallel to the axis of the die. The rotatable cooperating member 32 while having its forward end rounded off or made tapering is generally cylindrical throughout its length and is held in position through the means above described in connection with the other form. If the knife, or knives, (only one being shown) is denoted by 33 and is secured to the member 33.

2. A machine as set forth in claim 1 where-in the second choke is rotate within the die.

3. A machine as set forth in claim 1 where-in the second choke is cone-shaped and the adjacent ribs are contoured to conform to the choke.

4. In a pellet forming machine the combination of a press shell having draining open...
ings; a choke located at the discharge end of the shell; a shaft extending through the shell, through the coke and outwardly thereof; means carried by the shaft and cooperative with the shell to compress the material undergoing treatment and to force the cake produced past the choke; means for driving the shaft; a die located outwardly of the choke, said die having a series of spaced ribs formed interiorly thereof; a second choke mounted upon and rotatable with the shaft, said choke extending into the die and overlying the ribs, thereby forming channels through which the cake passing from the first choke is forced, producing string-like masses; and means for severing said masses.

5. A machine as set forth in claim 4 wherein the second choke is tapered at its inner end and the ribs which form the grooves in the die have their inner ends beveled.

6. A machine as set forth in claim 4 wherein the second choke is tapered at its inner end and the ribs have their inner edges tapered inwardly and brought to a sharp edge.

7. In a pellet making machine the combination of an annular die provided with a series of spaced ribs on the inner face thereof; a choke extending into said die and overlying the ribs in part at least; at least one knife carried by the choke, said knife lying adjacent the discharge end of the die; means for forcing material through the channels formed by the ribs and the choke; and means for rotating the choke.

8. In a pellet forming machine the combination of a press shell having drainage openings; a choke at the discharge end thereof; a shaft extending through the shell, the choke, and outwardly thereof; means carried by the shaft for compressing material within the shell; an annular-shaped die located adjacent the choke, said die having a plurality of spaced ribs formed interiorly thereof, the forward ends of the walls of the ribs tapering toward the choke and presenting sharp forward edges; a second choke secured to the shaft, said choke extending into the discharge end of the die; and at least one knife secured to said last-named choke and movable therewith across the path of material passing from the die.

9. In a pellet making machine, the combination of a press shell; an adjustable choke at the discharge end of said shell; a die located outwardly of said choke; a second choke cooperating with the die to form strings of material, which material has been previously forced outwardly through the first named choke; means located within the barrel of the press to subject the material undergoing treatment to compression and to force the same outwardly past the first named choke; means for rotating the second choke; and at least one knife associated with said second choke and movable across the discharge opening of the die.

10. In a pellet making machine, the combination of a barrel; means located therein for subjecting the material undergoing treatment to a high degree of compression; a choke cooperating with said means, said choke being located at the discharge end of the barrel; a die located outwardly of the choke; a second choke adjustably mounted with reference to the die for movement into and outwardly thereof; means for rotating said last named choke; and means for severing material extruded through the die and over the surface of the last named choke.

In testimony whereof I have signed my name to this specification.

RAYMOND TUTTLE ANDERSON.