I. FOREMAN & J. L. THORNTON.

MACHINE FOR FORMING ARTIFICIAL PRESSED FUEL.

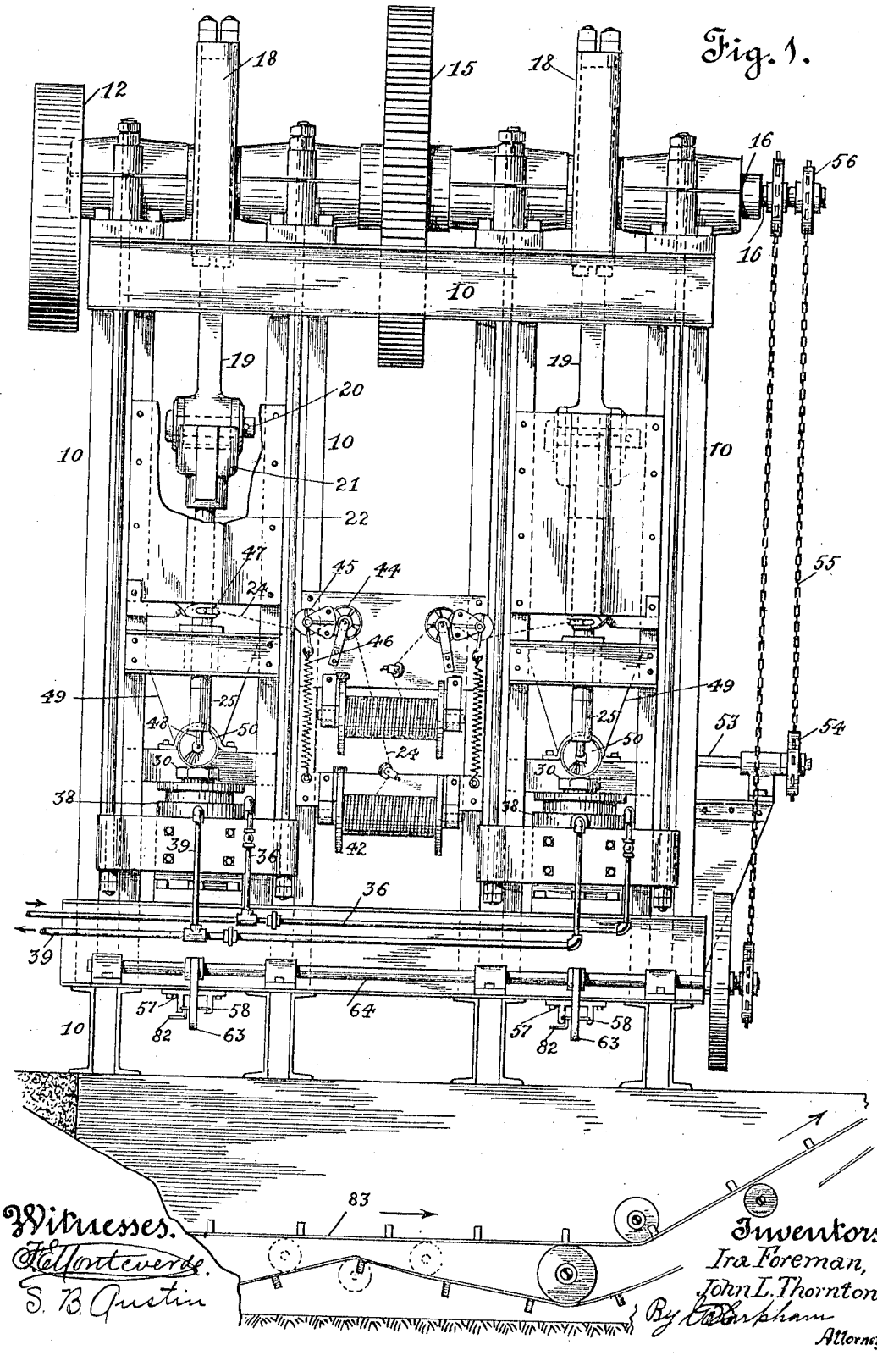
APPLICATION FILED MAR. 12, 1908.

949,176.

Patented Feb. 15, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

H. Montecerde.

S. B. Austin

Inventors,

Ira Foreman,

John L. Thornton.

By E. B. Brigham

Attorney.

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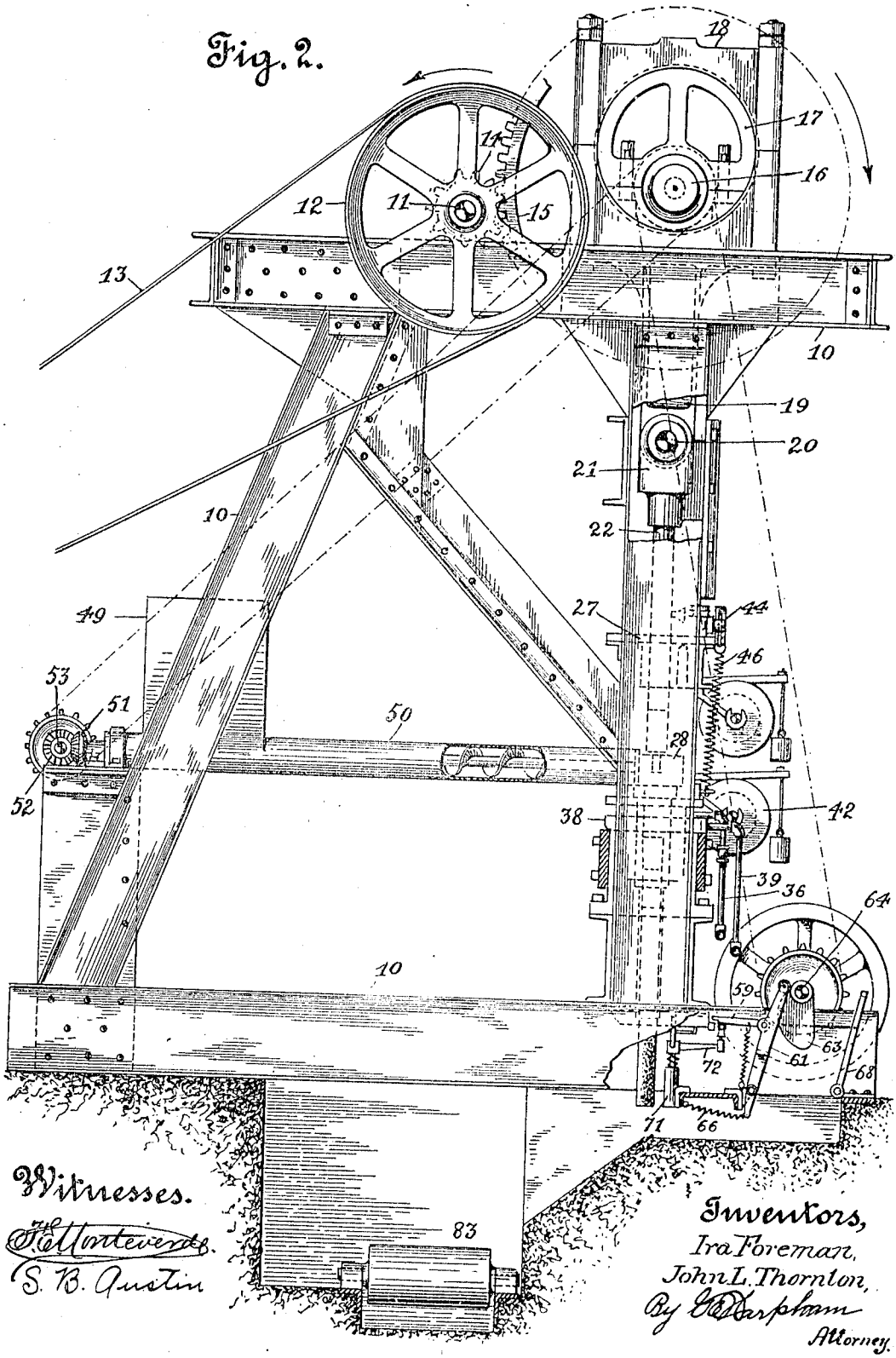
4 SHEETS—SHEET 2.

Fig. 2.



Witnesses.

F. H. Montevert.

S. B. Austin

Inventors,

Ira Foreman,

John L. Thornton,

By G. H. Parpham

Attorney.

I. FOREMAN & J. L. THORNTON.

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4 SHEETS—SHEET 3.

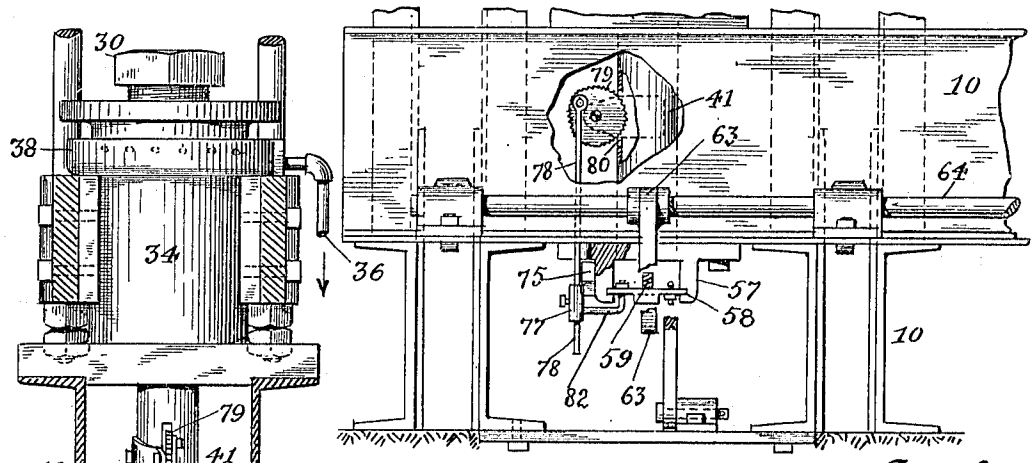

Fig. 3.

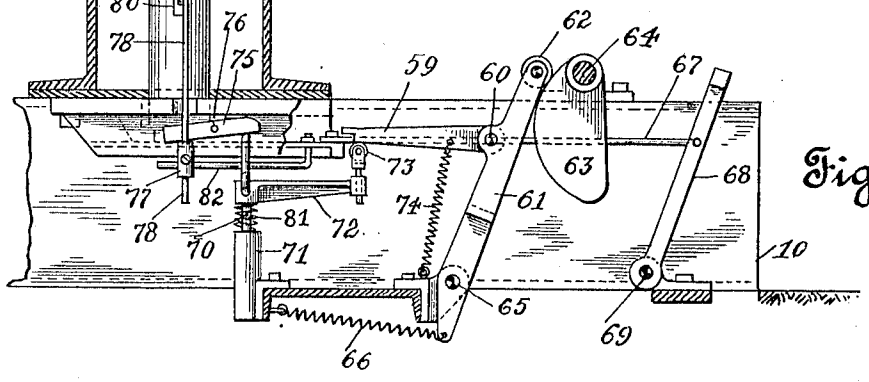

Fig. 4.

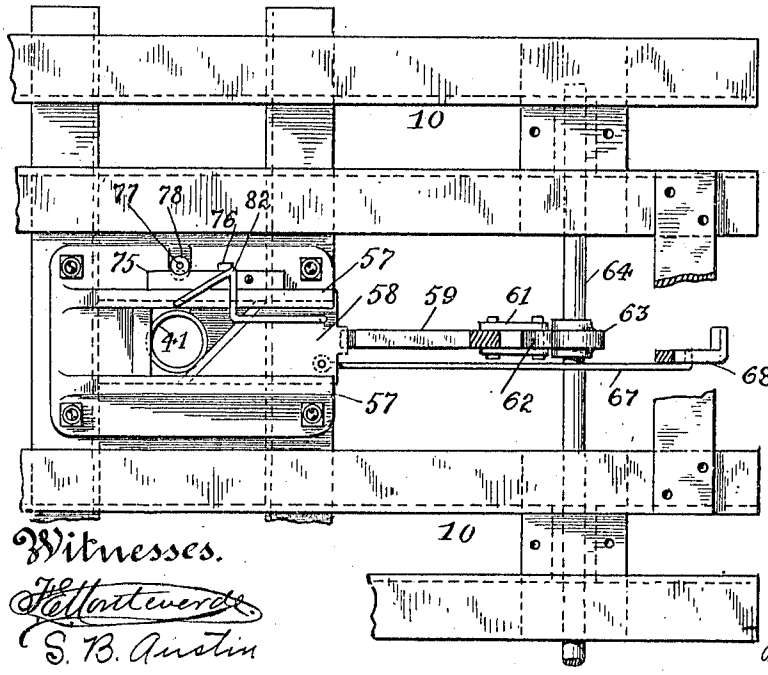

Fig. 5.

Witnesses.

H. Hartenveer

S. B. Austin

Inventors,

Ira Foreman,

John L. Thornton.

By E. E. Orpham

Attorney.

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4 SHEETS—SHEET 4.

Fig. 6.

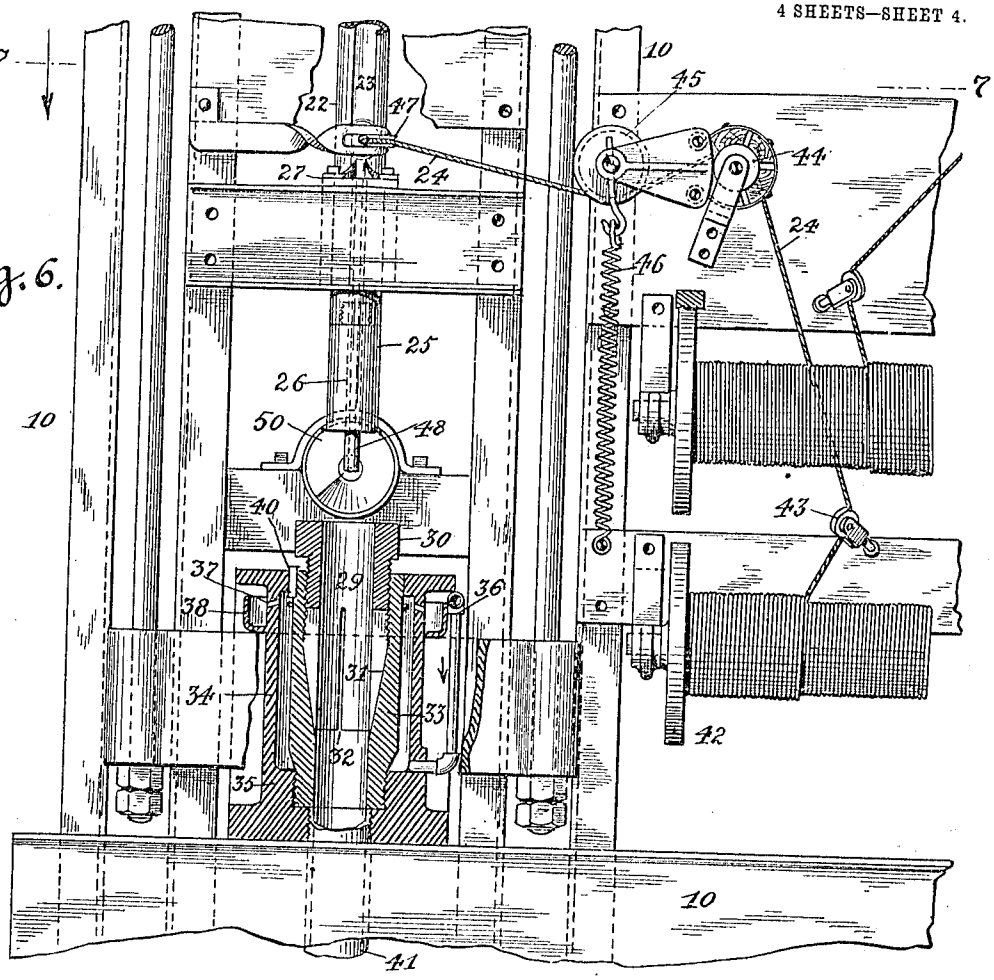
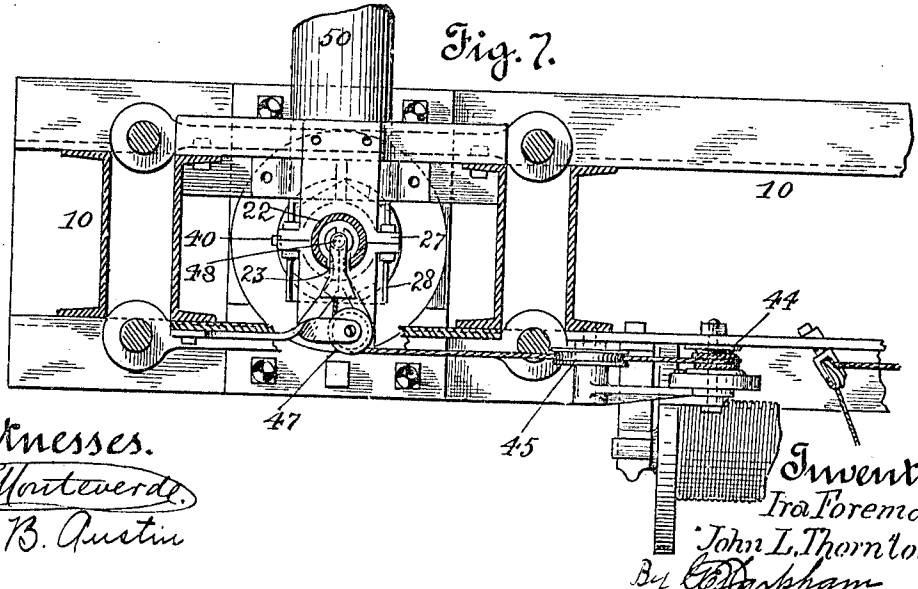


Fig. 7.



Witnesses.

H. Monteverde.

S. B. Austin

Inventors,

Ira Foreman,

John L. Thornton.

By Edgar Tarpham

Attorney

UNITED STATES PATENT OFFICE.

IRA FOREMAN AND JOHN L. THORNTON, OF LOS ANGELES, CALIFORNIA.

MACHINE FOR FORMING ARTIFICIAL PRESSED FUEL.

949,176. Specification of Letters Patent. Patented Feb. 15, 1910.

Application filed March 12, 1908. Serial No. 420,601.

To all whom it may concern:

Be it known that we, IRA FOREMAN and JOHN L. THORNTON, citizens of the United States, residing in Los Angeles, county of Los Angeles, State of California, have invented new and useful Improvements in Machines for Forming Artificial Pressed Fuel, of which the following is a specification.

Our invention relates to a machine for forming artificial fuel from comminuted material which will bond the same under heavy pressure, and the object thereof is to provide an efficient machine that will bond such material around a flexible core and which is capable of making a continuous stick and which is capable of cutting up the stick into suitable lengths. We accomplish these objects by the mechanism described herein and illustrated in the accompanying drawings in which:

Figure 1 is a front elevation of our improved machine. Fig. 2 is a side elevation of the same. Fig. 3 is an enlarged front detail of the mechanism for cutting the material the desired length. Fig. 4 is a side elevation of the parts shown in Fig. 3. Fig. 5 is a bottom plan view of the parts shown in Fig. 4. Fig. 6 is an enlarged front sectional elevation of the detail of the die and rope mechanism. Fig. 7 is a broken top plan of the parts shown in Fig. 6.

In the drawings we have shown a two unit machine, but machines may be constructed with one or more units, as each unit works independently of the other units, and each unit is constructed of complete operative parts, of the same construction and operation. Where two or more units are used, a common frame 10 would be used for all the units up to a reasonable number. In the frame preferably at the top thereof is mounted the driving shaft 11 carrying the driving pulley 12 which is operated by belts 13 driven in any suitable manner. The driving shaft carries a pinion 14 which meshes with a gear 15 mounted on shaft 16, which carries as many eccentric disks 17 as there are working units in the common frame. Each eccentric disk is provided with an eccentric frame 18 which is secured to eccentric rod 19 pivotally connected at 20 to the head 21 of the compression plunger. The upper portion of the compression plunger, or the part connected to the head, consists of a hollow body 22, with a slot 23 in the side thereof for the passage therethrough of the core which is preferably small rope or heavy cord 24. To the bottom of the body is secured a steel shoe 25 which exteriorly is the same size of the body and is centrally bored to provide longitudinally therethrough a channel 26. The plunger is guided by a guide block 27 secured to the frame, through which guide block the plunger reciprocates. The plunger also reciprocates through a feed box 28 and carries the material below the shoe into the die in which the material is compressed to the required density, to bond the material by compression. This die consists of a tubular body 29, the upper portion of which is exteriorly threaded up to the head 30. The lower portion of the body is tapered as shown at 31. The lower portion of the body is provided with four equi-distant slots 32 which extend from the tapered end upwardly about half the length of the die. The die screws into the central wall 33 of the cooling jacket which has a central bore therethrough, the upper portion of which is internally screw threaded as best shown in Fig. 6, for the reception of the screw threads of the die. Just below the screw threaded portion, the central bore tapers to fit the normal taper of the die, and below the die the bore is of a diameter equal to the internal diameter of the lower end of the die when in its normal position.

34 is the outer wall of the cooling jacket, and 35 is the bottom of the cooling jacket which is provided with a screw threaded bore for the reception of the inner wall of the cooling jacket which screws therein as shown in Fig. 6. This detachable construction of the inner wall of the cooling jacket is for convenience in manufacture, as it is easier to handle the inner wall detached from the other portions, when finishing the same for use.

A liquid supply pipe 36 opens into the bottom of the water jacket. This liquid supply pipe is connected to a source of supply not shown, from which suitable cooling liquid is supplied to the jacket, which would preferably be water. Through the outer wall of the cooling jacket and near the top thereof are ports 37 through which the cooling liquid introduced into the jacket escapes into a collecting trough 38 from which it is led by a pipe 39 outside the building.

A key 40 inserted in suitable keyways in

the outer and inner walls as shown in Fig. 6 prevents the accidental rotation of the inner wall.

By slitting the lower portion of the die and by having the same received into a tapered bore the lower end of the bore through the die can be reduced in size so as to cause the desired resistance upon the material passing through the die to cause the same to bond itself around the core as the material and core is forced through the die.

In the lower end of the central bore of the cooling jacket is the delivery pipe 41 through which the finished material passes.

Mounted in suitable bearings secured to the frame are core drums 42 which carry the core material 24 thereon. The core material passes through a guide pulley 43 thence around friction winch 44, a sufficient number of times to produce the desired tension, thence around pulley of the take up device which consists of pulley 45 and spring 46, thence around direction changing pulley 47 and into tube 48 which extends from the feed box up through the shoe and tubular body and out through the slot and preferably has the outer end enlarged and funnel shaped.

49 is the feed hopper into which the comminuted material is delivered and from this feed hopper the material is conveyed by screw conveyer 50 to the feed box. The screw conveyer shaft is provided with a bevel gear 51 which meshes with bevel gear 52 mounted on shaft 53. On shaft 53 is mounted a sprocket wheel 54 which is connected by chain 55 with a sprocket wheel 56 mounted on shaft 16. It will be understood that there is a conveyer for each unit.

As the material is fed into the feed box the shoe of the compression plunger reciprocates through the same and carries the material down into the die and compresses the same therein around the core material, each stroke forcing more material into the die and compressing the same around the core material until the desired compression is obtained, which is a compression sufficient to bond the material around the core. The additional material as it is compressed will force the formed material into the delivery tube and as soon as a sufficient length of the material has passed out of the end of the delivery tube the same is cut off automatically by the following described mechanism: In a guide frame 57 is mounted a cutter or knife 58 which is adapted to move across the end of the delivery tube at right angles thereto. This knife is moved by arm 59 pivotally secured at 60 to lever 61 the upper end of which is furcated and in the furcations thereof is mounted an anti-friction roller 62 which bears against the cam 63 mounted on a shaft 64. Lever 61 is pivotally mounted at 65 to the frame, and on the lower end thereof is secured a spring 66, the other end of which is fastened to the frame as shown in Fig. 4. This spring keeps the friction roller in engagement with the cam, and when the parts are in the position shown in Fig. 4, as lever 61 is moved by the cam the end of arm 59 bears against the end of the knife and pushes the same across the end of the delivery tube, thereby severing all of the material that projects below the end thereof from that which is in the delivery tube. This movement is so timed that the compression plunger is on the upward stroke as the knife passes to and fro across the end of the delivery tube. The return movement of the cutter is effected by a rod 67 one end of which is secured to the knife and the other is secured to the return lever 68 which is pivoted at 69 to the frame. It will be observed that lever 68 moves toward the cam whenever the knife is pushed across the end of the delivery tube and that the cam engages lever 68 to return the knife back. To prevent the reciprocation of the knife across the end of the delivery tube upon each revolution of the cam, and permit it to pass across the same when desired, the following mechanism is provided: A rod 70 is telescopically mounted in a tube 71 secured to the frame. Rod 70 carries an arm 72, the outer end of which carries a friction roller 73 which bears against the underside of arm 59 and normally holds the end of said arm at an elevation above the cutter, so that as arm 59 is reciprocated by the cam it passes above the knife until the arm is depressed to the position shown in Fig. 4, when arm 59 is brought into engagement with the rear end of the cutter by spring 74, one end of which is secured to the arm and the other to the frame.

Resting upon the top of rod 70 is a lever 75 which is pivoted at 76. The other end of this lever is adapted to be engaged by an adjustable collar 77 mounted on the end of rod 78, which rod is carried by a toothed wheel 79 mounted in bearings secured to the delivery tube. The delivery tube is provided with a slot 80 best shown in Fig. 3 through which the edge of toothed wheel projects far enough into the interior of the tube to be engaged by the material passing down therethrough and to be revolved thereby. When this toothed wheel has been operated to bring rod 78 to the position shown in Figs. 3 and 4 collar 77 has raised the end of lever 75 with which it is engaged sufficiently to depress the other end bearing upon rod 70 to depress the same against the action of spring 81 to lower anti-friction roller 73 to the position shown in Fig. 4 which is a position which permits arm 59 to engage the knife. The knife carries a detaching arm 82 which, when the knife is moved forward across the end of the deliv-

ery tube engages collar 77 and moves the same from beneath the end of lever 75, whereupon spring 81 throws the end of the lever below the collar and friction roller 73 engages the end of arm 59 and elevates the same above the plane of the knife so that it will no longer engage the same when reciprocated by the cam. As fresh material is forced out of the delivery tube, toothed wheel 79 is revolved, thereby carrying collar 77 below the end of lever 75 when the rod 78 is at its lowest stroke, and when the toothed wheel is revolved so as to again bring the collar into engagement with lever 75 sufficiently to again depress arm 72 to permit arm 59 to again engage the arm of the cutter another stick is cut off by the knife. It will be understood that the size of the toothed wheel determines the length of the stick as a stick is cut off each time the toothed wheel is revolved. The sticks when cut off drop upon a traveling apron 83 which travels below the machine and carries the sticks to a bin not shown.

Having described our invention what we claim is:

1. In a machine for making artificial fuel the combination of a die; a reciprocating plunger having a core channel therein; means for feeding a flexible inflammable core through said channel; and means independent of the mountings of the core carrying device for holding the core material taut during the reciprocation of the plunger.

2. In a machine for making artificial fuel the combination of a reciprocating plunger, said plunger having a central bore and a slot on one side thereof; an adjustable die into which said plunger reciprocates; a water jacket surrounding said die; a delivery tube below said die; and mechanism for cutting off predetermined lengths of fuel as the same is projected below the delivery tube.

3. In a machine for making artificial fuel, the combination of a die; a reciprocating plunger having a central bore in the lower portion and a slot in the side thereof; and means for feeding a flexible core through the plunger.

4. In a machine for making artificial fuel, an adjustable die; a water jacket surrounding the same; a reciprocating plunger having a core channel therein; means for feeding a flexible core under tension through said plunger; and means for cutting off predetermined lengths of formed material.

5. In a machine for making artificial fuel an adjustable die; a water jacket surrounding the same; a reciprocating plunger having in the lower portion a central core channel opening through the side; means to feed a flexible core under tension through said channel; a delivery tube; a cutter, and means to reciprocate said cutter across the end of the delivery tube at predetermined periods.

In witness that we claim the foregoing we have hereunto subscribed our names this 4th day of March, 1908.

IRA FOREMAN.
JOHN L. THORNTON.

Witnesses:
G. E. HARPHAM,
S. B. AUSTIN.