No. 704,698. Patented July 15, 1902.

S. O. EDISON.

PROCESS OF TREATING FIBERS OF ANNUAL GROWTH FOR INDUSTRIAL PURPOSES.

(Application filed June 19, 1900.)

(No Model.) 2 Sheets—Sheet 1.

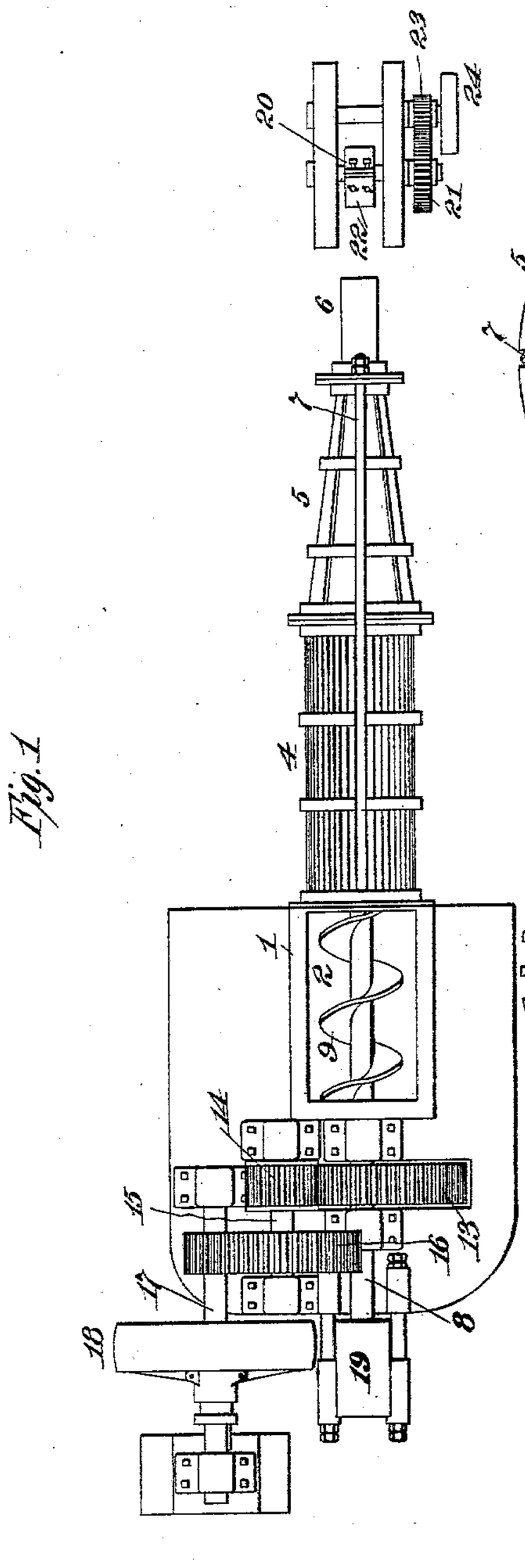

Fig. 1.

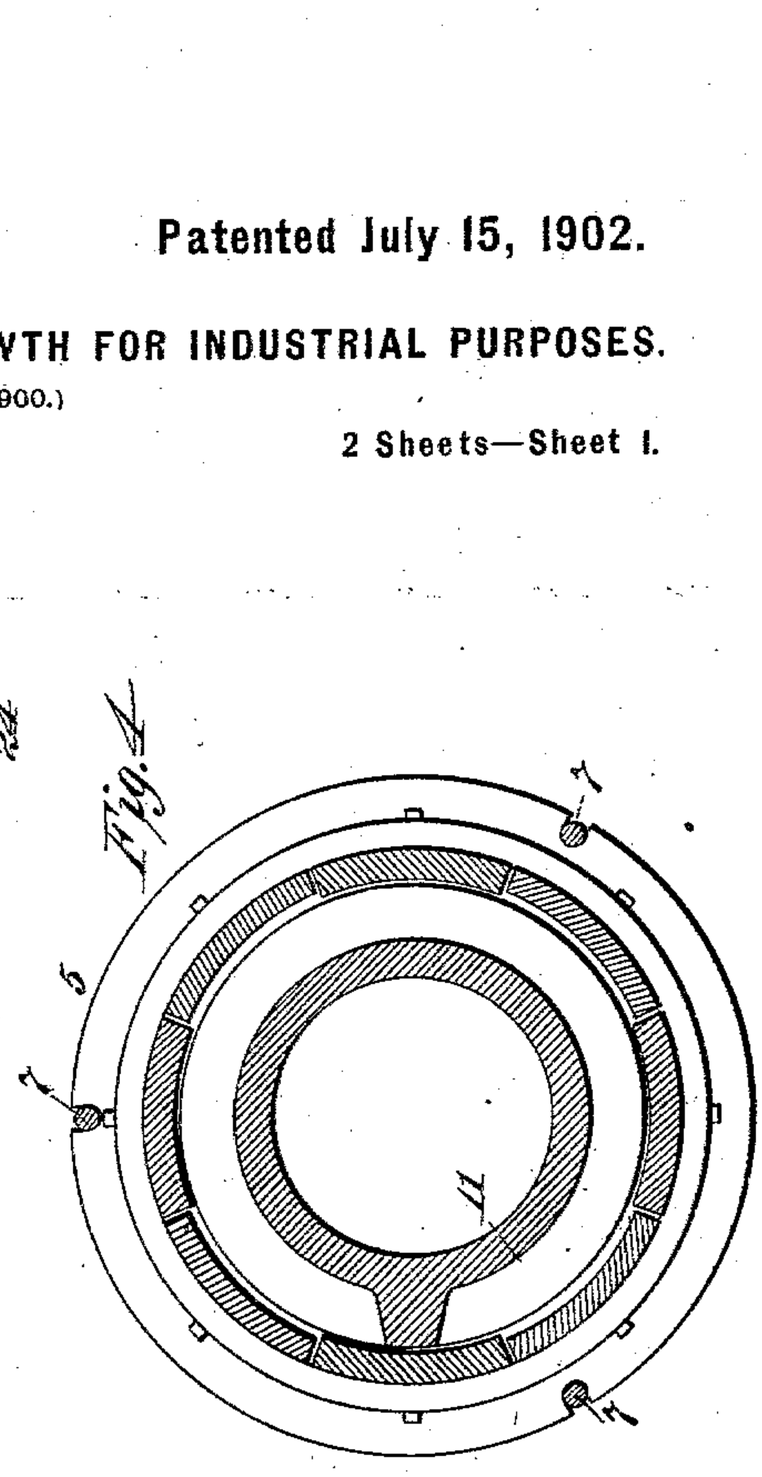

Fig. 2.

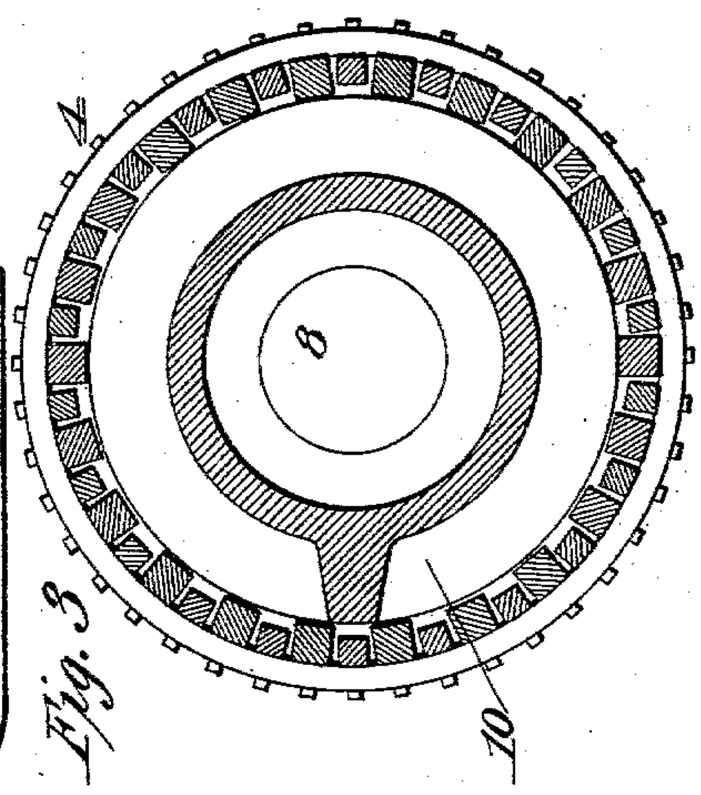

Fig. 3.

Witnesses:

Jas. F. Coleman

Jno. R. Taylor

Inventor

Simeon Ogden Edison

by Dyer Edmonds & Dyer

Att'ys.

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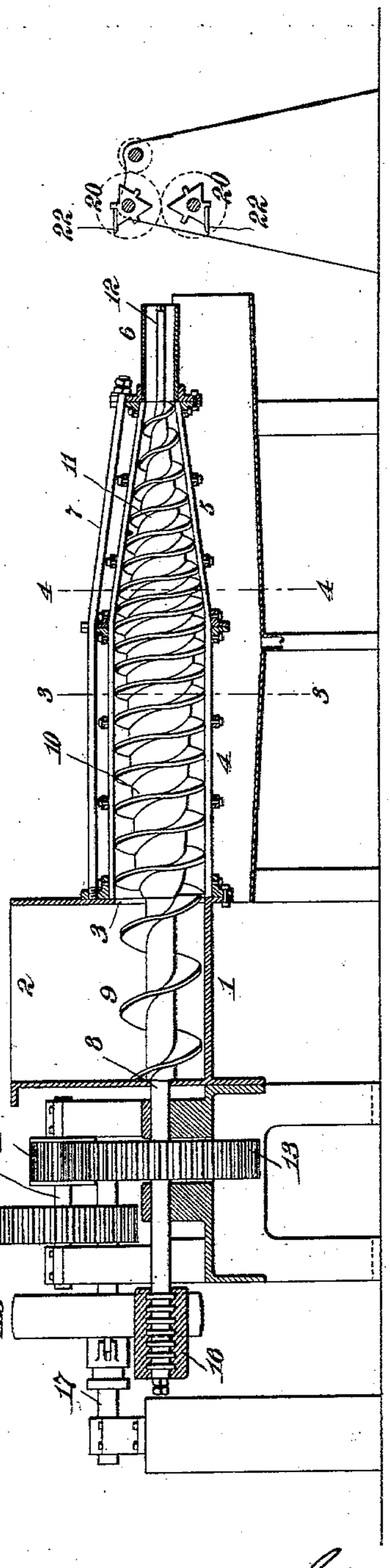
Fig. 2



Witnesses:
Jas. F. Coleman
Jno. R. Taylor.

Inventor
Simeon Ogden Edison
by Dyer Edmonds & Dyer
Att'ys.

UNITED STATES PATENT OFFICE.

SIMEON OGDEN EDISON, OF EAST ORANGE, NEW JERSEY.

PROCESS OF TREATING FIBERS OF ANNUAL GROWTH FOR INDUSTRIAL PURPOSES.

SPECIFICATION forming part of Letters Patent No. 704,698, dated July 15, 1902.

Application filed June 19, 1900. Serial No. 20,813. (No specimens.)

To all whom it may concern:

Be it known that I, SIMEON OGDEN EDISON, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Process of Treating Fibers of Annual Growth for Industrial Purposes, of which the following is a description.

My invention relates to an improved process by which I am enabled to utilize for industrial purposes fibers of annual growth—such as grasses, grain, corn, sugar-cane, &c.—whether in the natural form or more or less desiccated and straw-like in character. At the present time enormous quantities of these annual fibers are produced in this country; but, so far as I know, they have never been effectively utilized for an industrial purpose. It appears to be a fact that in those sections of the United States where the greatest quantities of these annual fibers are produced the supply of available fuel is very much restricted. By my process I aim to convert the natural or dried fibers referred to into an effective fuel of such a character that a smoldering flame will be obtained therefrom, as in the burning of coal, as distinguished from a blaze, as results from the ignition and consumption of wood.

In carrying my invention into effect I first take the fibers in their natural lengths without any cutting by special machinery and subject them to the effect of heat, either by a boiling in water or by a treatment with steam, until the fibers are softened, but have not entirely lost their identity and are still more or less continuous, and I then subject the mass which has thus been treated to a heavy compression, by which water will be expressed from the mass and the latter formed into blocks or other shaped pieces of the desired size, which, with or without further drying, are in condition for use as an effective fuel. When the fibers are desiccated or straw-like in character, they may be immediately subjected to heat for treatment as explained; but when freshly cut they should first be allowed to dry by exposure to the atmosphere.

In order that my invention may be better understood, attention is directed to the accompanying drawings, wherein I illustrate a convenient machine for compressing the mass of fibers after they have been treated by heat and removing the water therefrom.

Figure 1 represents a plan view thereof; Fig. 2, a vertical sectional view; Fig. 3, a section on the line 3 3 of Fig. 2, and Fig. 4 a section on the line 4 4 of Fig. 2.

In all of the above views corresponding parts are represented by the same numerals of reference.

Before describing the compressing-machine in detail the preliminary treatment to which the fibers are subjected before being compressed may be briefly referred to. The natural fibers of annual growth—such as grasses, grains, corn, sugar-cane, &c.—whether in the natural form or more or less straw-like in character, are first subjected to heat, either by being cooked in water or by being subjected to steam in a closed vessel, until the fibers are softened, but have not entirely lost their identity and are still more or less continuous. It will of course be understood that lime-water may be employed to facilitate the cooking, as is done in the manufacture of strawboard. These fibers are subjected to this treatment preferably in their natural lengths, as they do not require any special cutting into shorter lengths. The resulting heated mass after being drained as much as possible of superfluous water is then compressed, the water being simultaneously expressed therefrom.

Referring now to the apparatus shown in the drawings, which may be conveniently used for carrying my process into effect, 1 represents a box having a curved bottom and formed with a hopper 2, into which the heated mass may be introduced. The box or body 1 is formed with a round opening 3 at its end, and connected therewith is a cylinder 4, bolted in place to the front wall of the body, as shown. This cylinder, as shown in Fig. 3, is formed, preferably, of a series of slats, each being rectangular in cross-section, whereby channels are formed between the slats for the escape of water expressed from the mass during the compression thereof. In order to reduce the longitudinal friction of the mass in its passage through the cylinder 4, I make the slats forming the same alternately thick and thin, as shown, so that the material in transit through the cylinder will bear the greatest friction only upon the relatively

limited area of the thicker slats. Connected to the open outer end of the cylinder 4 is a tapered chamber 5, formed also of a series of slats, as shown, which preferably are alternately thick and thin for the same purpose as that explained. At the extreme end of the tapered chamber 5 is a cylindrical pipe 6, secured in place, as shown, tie-rods 7 being employed to strengthen the parts referred to and to resist the longitudinal thrust. Mounted in the body 1 is a main shaft 8, which carries a screw 9 thereon for feeding the material deposited in the hopper 2 and forcing such material into the cylindrical chamber 4. Mounted in said chamber is a screw 10, which forms a continuation of the screw 9 and is rotated therefrom. The screw 10 is preferably made of the same external diameter throughout, as shown, so as to fit more or less closely in the cylindrical chamber 4; but its body or core is gradually tapered toward the body 1, so as to offer a smaller space for the passage of the material between the threads of the screw as the material progresses away from the body, whereby the material will be subjected to a gradual compression and the water therein will be expressed between the slats forming the body. Connected to the screw 10 and forming a continuation thereof is a tapered screw 11, which works within the tapered chamber 5 and which also effects a further compression of the material. The screw 11 carries at its extreme outer end a cylindrical core 12, which fits within the pipe 6, so that the material expelled by the screw 11 from the tapered chamber 5 is caused to pass around the core 12 and between said core and the pipe 6, whereby the material will be formed into a continuous tube having a bore dependent upon the size of the core 12.

In order to rotate the shaft 8, so as to turn the several screws of the device, any suitable driving mechanism may be employed. For this purpose I show a spur-gear 13 keyed to the shaft 8 adjacent to the body 1 and driven by a pinion 14 on a counter-shaft 15. A spur-gear 16 on said counter-shaft is driven from a pinion on the driving-shaft 17, said shaft having a belt-wheel 18, to which power is applied. In order to resist the thrust of the screws 9, 10, and 11, the shaft 8 takes into a heavy thrust-bearing 19 at its outer end, as shown.

The material, after it has been compressed and water expelled therefrom, passing through the pipe 6 around the core 12, is cut up into convenient lengths by any desired form of cutting-machine. In the drawings I illustrate a cutting device having a pair of rotary cutters 20 geared together, as shown, by gears 21 and carrying one or more cutting-blades 22. Obviously by providing the cutters each with more than one cutting-blade the material will be cut into shorter lengths. Power is applied to one of the gears 21 by a pinion 23 from a belt-wheel 24, which receives power in any suitable way.

It will be understood that the material after it has been subjected to heat is deposited in the hopper 2 and is forced therefrom by the screw 9 into the cylindrical chamber 4. In this chamber the material will be subjected to a gradually-increasing pressure imposed thereon by the screw 10, so that water will be expressed from the material and will escape between the slats forming the cylindrical body. From the cylindrical chamber 4 the material is forced into the tapering chamber 5, in which it is subjected to further pressure and an additional percentage of water expressed therefrom, whereby the material will enter the pipe 6 sufficiently free from water as to be combustible. In the pipe 6 the material in passing around the core 12 will be formed into a continuous tube, which will be cut up into sections of the desired length between the two cutting-blades 22 22 of the cutting device. By forming the combustible material into tubular sections, as is preferable, a more rapid and complete drying thereof can be secured than would otherwise be the case.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. The process of treating straw and other annual vegetable fibers for converting them into combustible briquets, consisting in cooking the fibers by subjecting them to the effect of a moist heat until the fibers are softened but have not entirely lost their identity, and finally in simultaneously expressing water from the mass and compressing the mass into combustible blocks, substantially as and for the purposes set forth.

2. The process of treating straw and other annual vegetable fibers for converting them into combustible briquets, consisting in cooking the fibers by subjecting them to the effect of a moist heat until the fibers are softened but have not entirely lost their identity, in simultaneously expressing water from the mass so treated and forming the mass into a continuous longitudinally-moving body, and in finally cutting such body by cross-cuts into blocks of the desired length, substantially as set forth.

This specification signed and witnessed this 8th day of June, 1900.

SIMEON OGDEN EDISON.

Witnesses:
FRANK L. DYER,
S. O. EDMONDS.