No. 665,972. Patented Jan. 15, 1901.

W. A. PATTERSON.

FUEL COMPRESSOR.

(Application filed July 16, 1900.)

(No Model.) 2 Sheets—Sheet 1.

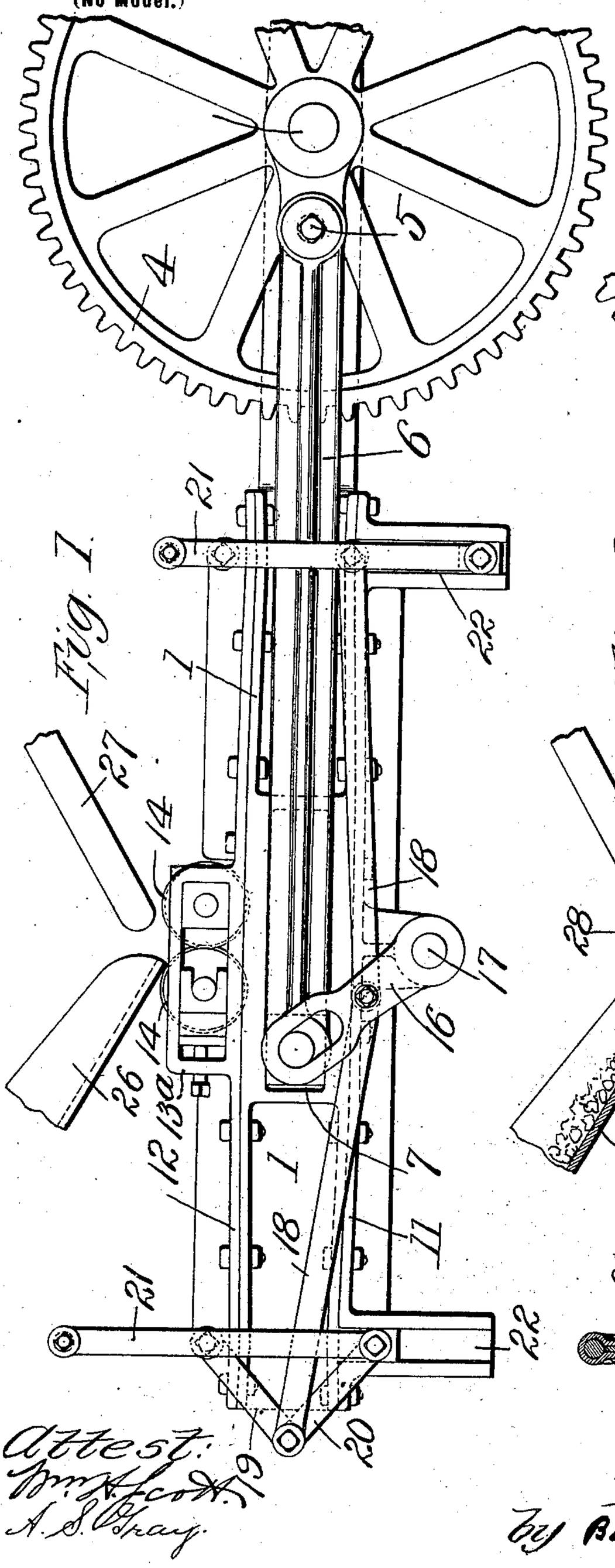

Fig. 1.

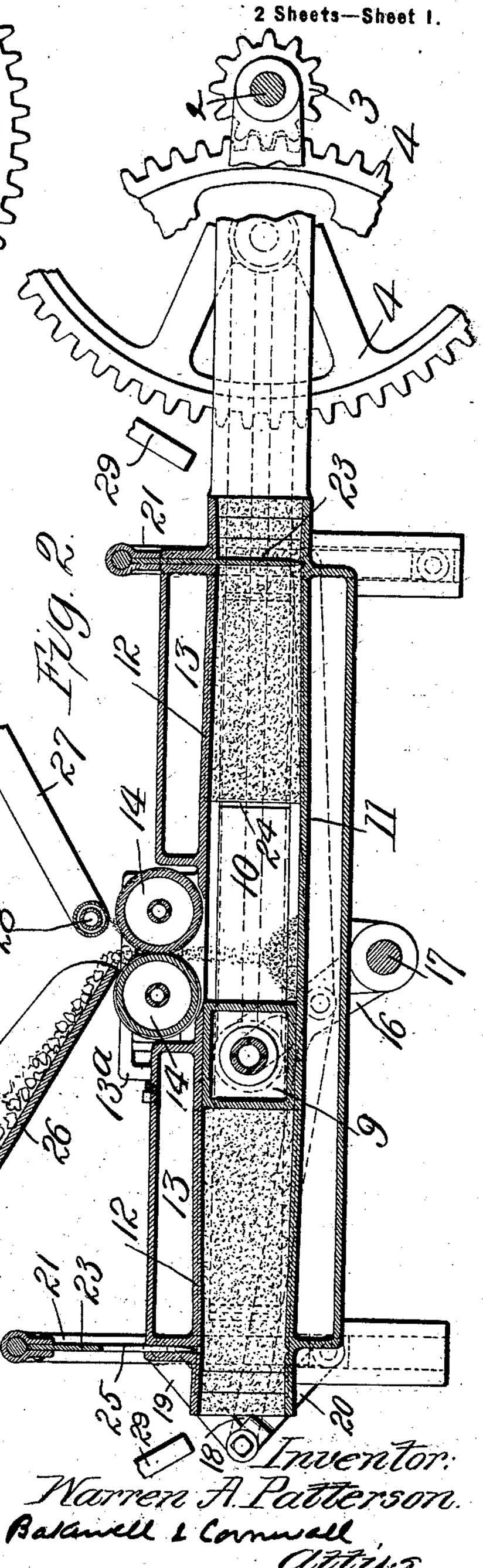

Fig. 2.

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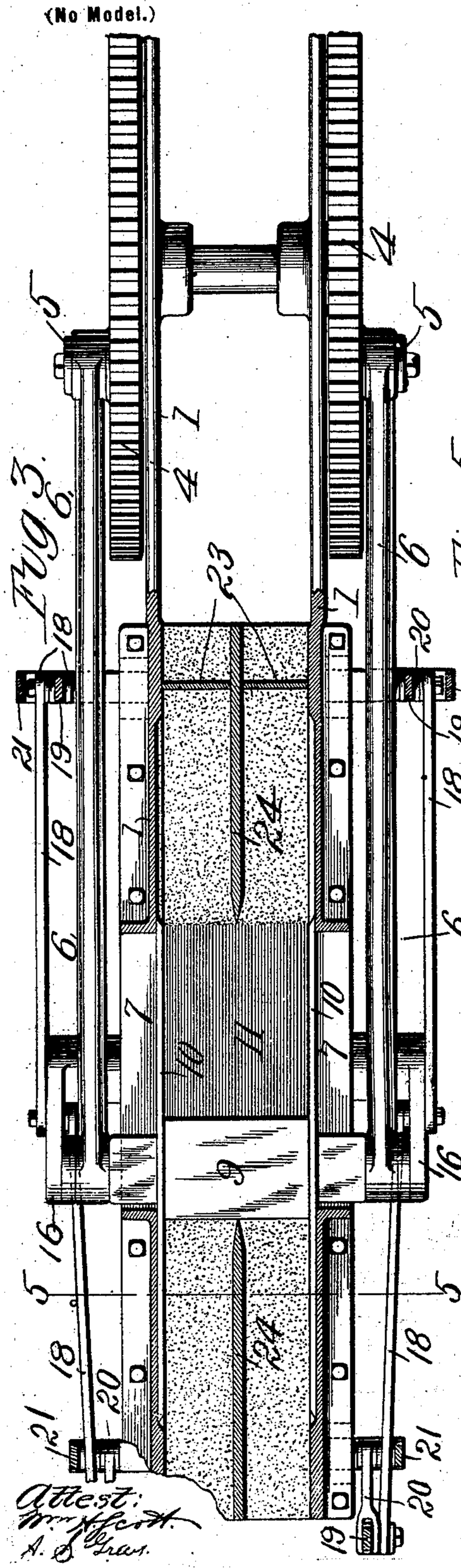

Fig. 3.

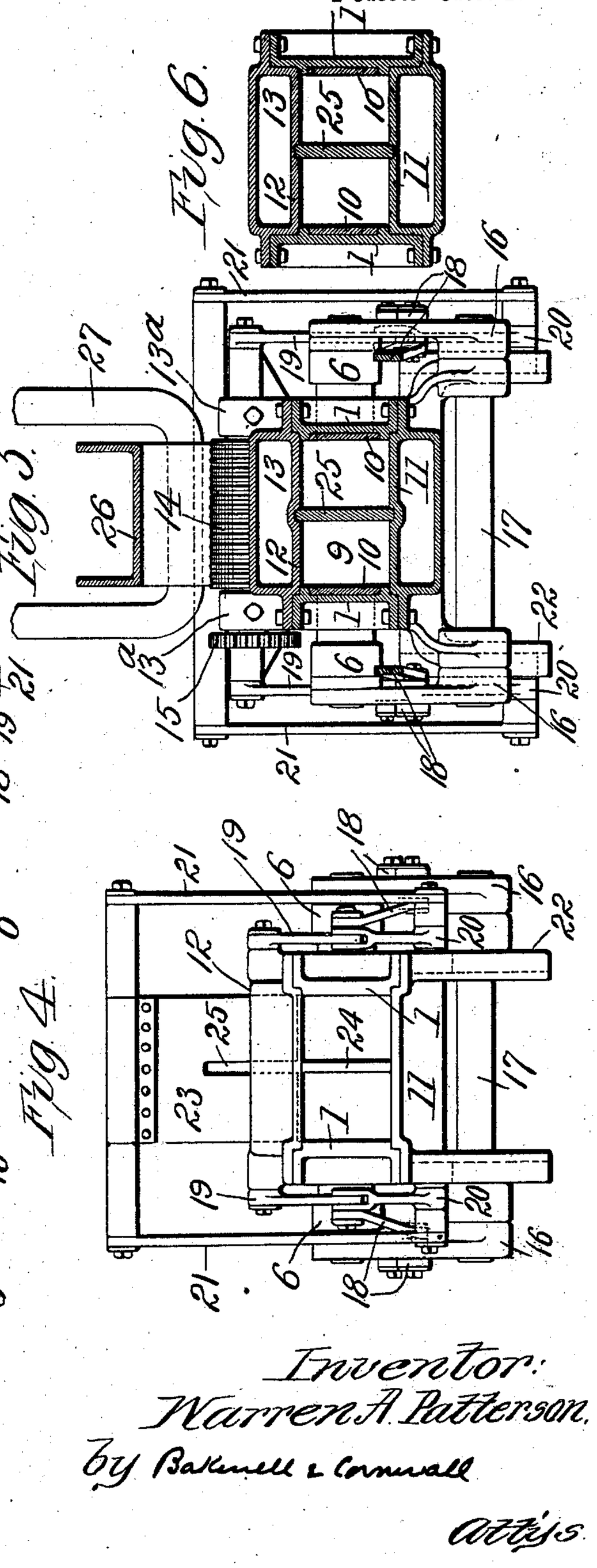

Fig. 6.

Fig. 5.

Fig. 4.

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UNITED STATES PATENT OFFICE.

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FUEL-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 665,972, dated January 15, 1901.

Application filed July 16, 1900. Serial No. 23,745. (No model.)

To all whom it may concern:

Be it known that I, WARREN A. PATTERSON, a citizen of the United States, residing at the city of Dallas, county of Dallas, State of Texas, have invented a certain new and useful Improvement in Fuel-Compressors, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevational view of my improved fuel-compressor. Fig. 2 is a vertical sectional view through the same. Fig. 3 is a horizontal sectional view. Fig. 4 is an end elevational view. Fig. 5 is a sectional view on line 5 5, Fig. 3; and Fig. 6 is a cross-sectional view of a modified form of housing.

This invention relates to a new and useful improvement in fuel-compressors, the object being to break up or crush fuel to be compressed, preferably in the form of corncobs, and introducing a liquid combustible material during the crushing operation of the fuel, the crushed mass mixed with the liquid combustible falling in the path of a vibrating plunger, which serves to compress the material, suitable mechanism being provided at each end of the machine for forming the compressed fuel into blocks of convenient size for handling.

With this object in view the invention consists in the arrangement, construction, and combination of the several parts, all as will hereinafter be described and afterward pointed out in the claims.

In applications filed contemporaneously with this case I have described and claimed the method of making the blocks of fuel referred to in this case and also described and claimed the fuel as an article of manufacture. These applications referred to are serially numbered 23,746 and 23,747, respectively.

In the drawings, 1 indicates two side frames, preferably in the form of castings, said frames carrying a shaft 2 at one of their extremities, upon which shaft are mounted pinions 3 in mesh with gears 4. These gears carry wrist-pins 5, upon which are mounted pitmen 6. The side frames are provided with suitable openings 7, in which operate the cross-head carrying a plunger 9, operating, preferably, between the frames. In order to close the opening 7 during the entire movement of the plunger in either direction, I prefer to arrange plates 10 on the plunger, which operate in suitable guideways on the inner faces of the side frames, as shown in Fig. 3.

11 indicates the bottom plate, which is mounted between the side frames, said bottom plate being preferably chambered for the introduction of steam or hot water for purposes which will hereinafter be described. This bottom plate is preferably formed with a horizontal face throughout the length of stroke of the plunger, the ends of said plate being inclined upwardly from the horizontal portion in order that the material to be compressed will be subjected to a gradual pressure by the plunger. However, these ends may be straight or on the same plane as the middle portion of the plate, in which event a greater inclination should be given to the top plate, or vice versa.

12 indicates the top plate, whose central portion is parallel to the central portion of plate 11 throughout the entire stroke of the plunger, the ends of said top plate inclining downwardly, as before described, or being on the same plane as the middle, in which event a greater inclination should be given to the ends of the bottom plate. In the construction shown the ends of both the top and bottom plates gradually converge to form a contracted mouth, the material being piled up and compressed between said plates, and as said material is forced to travel outwardly the converging top and bottom plates subject it to greater pressure. The top plate is preferably formed with chambers 13 at its ends for the reception of steam or hot water whose heat is radiated to the material being operated upon, so that said material is kept at a high temperature during the time it is in the machine. I will also state that the plunger 9 is preferably made hollow to form a steam or hot-water chamber, as shown in Fig. 2,

suitable pipe connections being arranged to conduct steam or hot water to and from these several chambers, said pipe connections not appearing upon the drawings, but being well understood.

The top plate 12 carries slotted frames 13ª on each side, in which are mounted suitable boxes, affording bearings for rollers 14. These rollers are preferably made hollow and kept heated by steam or hot water. I prefer to circumferentially corrugate the peripheries of these rollers, as shown in Fig. 5; but the same may be corrugated longitudinally, and gears 15, mounted on the axles of the rollers, mesh with each other and drive said rollers in opposite directions, so as to crush the material delivered therebetween and force it into the machine. Any suitable power may be employed to drive one or the other of the rollers 14.

16 indicates crank-arms mounted on a rock-shaft 17, preferably extending transversely under the machine, said crank or rock arms being slotted at their outer ends to receive the trunnions of the plunger, whereby when said plunger is vibrated said crank-arms will be rocked coincidently therewith.

18 indicates links connected to the crank-arm 16 at their inner ends, their outer ends being connected to toggle-levers 19 and 20, the former of which has fixed pivot-points, while the latter are pivotally connected to vertically-movable frames 21, mounted in suitable guideways 22, said guideways being formed in the outer faces of the legs of the side frames. These vertically-movable frames 21 carry knife-blades 23, which pass through suitable openings in the top plate and serve to sever the compressed material into blocks as it issues from the machine.

24 indicates blades suitably secured between the top and bottom plates at the ends of the machines and beyond the path of the plunger. The cutting edges of these blades are at their inner ends and terminate at the stopping-point of the plunger in its stroke, while the outer ends of these blades preferably extend to the extremities of the top and bottom plates. As shown in Figs. 3 and 4, the vertically-movable knives 23, which sever the material transversely, are slotted at 25 to receive the knife-blades 24.

26 indicates the end of a chute leading from some source of solid-fuel supply, said fuel being supplied on said chute to be delivered to the rollers 14 in given quantities. At some convenient point, preferably above the compressor, I arrange a tank (not shown) in which the liquid combustible is heated and mixed if composed of more than one ingredient, said tank being tapped by looped pipe 27, whose connecting or cross member is preferably perforated above one of the rollers 14 to deliver the liquid combustible onto said roller, so that the liquid is fed into the machine with the crushed material.

To keep the liquid combustible hot, I arrange a steam or hot-water pipe 28 in the pipe 27, as shown in Fig. 2. This liquid combustible preferably consists of a mixture composed of thirty-two parts resin, two parts cedar-tops, and one part petroleum, the cedar-tops being broken from the tops and extremities of the branches of cedar-trees and introduced into the melted resin and boiled. The object in introducing the cedar-tops is not so much for the purpose of extracting the resinous and combustible substance therefrom as it is to impart a glaze to the resin and petroleum, rendering the same susceptible of being congealed more quickly after the fuel passes from the machine.

The pipe 29 is preferably arranged to deliver a blast of cold air onto the fuel issuing from the discharge ends of the machine in order to congeal the liquid ingredient, and as the blocks are forced beyond the machine I prefer to arrange a traveling belt for receiving said blocks and conducting them to some suitable point.

In operation the device illustrated in the accompanying drawings is designed to receive the corncobs directly from the corn-shelling machine, an interposed feeding device being provided to prevent the cobs crowding the fuel-compressor, said feeding device serving to equalize the feed to the compressor. As the cobs pass between the rollers 14 they are crushed and at the same time forced into contact with the liquid combustible supplied from the pipe 27. The proportion of this liquid-supply is in volume about one to three—that is, the pressed fuel contains about one part of the liquid combustible and three parts solid—in this instance, corncobs. This mass, both liquid and solid material, passing between the rollers 14 falls to one side or the other of the plunger 9, that falling on top of the plunger being scraped off by the edges of the top plate. The links 18 are disconnected, so as to permit the knives 23 to remain in their lower position until the plunger builds up the fuel at each end of the machine and compresses said fuel into a compact mass. The links are now connected to the rock-arm 16, and at each movement of the plunger the material which is piled up in advance thereof is added to the mass of material at the ends of the machine. By giving to the top and bottom plates the proper inclination the fuel can be compressed to the extent desired, the compression at each extremity of movement of the plunger occurring when the knives 23 are raised, so that the material after being compressed by the inclined top and bottom plates passes beyond said knives, and as the plunger recedes from the elevated knife said knife descends and severs the compressed material, this operation occurring at each end of the machine. The gradual compression of the fuel and the length of time it takes the fuel to pass through the machine after being introduced thereinto enable the liquid ingredient to thoroughly saturate the solid, the

contraction of the top and bottom plates at the discharge ends of the machine forcing the liquid and solid ingredients more intimately together and making the mass more compact. When the blast of cold air congeals the liquid material on the surface of the severed blocks, it enables said blocks to be handled and packed, the temperature of the blocks being further reduced by causing said blocks to travel some distance along a conveyer-belt, upon which they lose their heat.

While I have shown a double-ended machine in the drawings—to wit, one in which the material is compressed and discharged at each end—it will be obvious that by interrupting the feed of material to the machine during that period of time that the plunger is moving in one direction the plunger can be made to press only in one movement. Such a single machine would of course have but one-half the capacity of the machine shown in the drawings.

If desired, I can arrange two or more knives or partitions 24 in each end of the machine, which will increase the capacity of the machine accordingly, or I may arrange both horizontal and vertical partitions in "pigeon-hole" style, as is obvious.

It will be observed from a glance at Fig. 2 that the upper and lower plates 12 and 11 converge at each end of the machine only to a point coincident with the vertically-movable knives, after which they assume either a horizontal parallel direction or a slightly-diverging relation to each other. The object of having these ends of the machine horizontal or diverging is that when the mass which has been pressed in the machine is cut into blocks it can be more readily forced out of the end of the machine, having less tendency to stick together after being cut and permitting said blocks to expand, which they have a tendency to do after their release from the converging portion of the machine.

I am aware that minor changes in the arrangement, construction, and combination of the several parts of my device can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a machine of the character described, the combination with a casing, of a vibrating plunger operating therein, a rock-arm connected to said plunger, a vertically-movable frame carrying a knife, toggle-levers for operating said frame, and a link connecting said rock-arm and said toggle-levers; substantially as described.

2. In a machine of the character described, the combination with a suitable casing having guideways, of a vertically-movable frame mounted in said guideways, a knife carried by said frame and designed to traverse the casing, toggle-levers for operating said frame, a plunger arranged within the casing for compressing the material, and connections between said plunger and said toggle-levers, whereby said knife-frame is reciprocated; substantially as described.

3. In a machine of the character described, the combination with a steam-jacketed casing, of a hollow plunger operating in said casing, said plunger being designed to be heated by steam or hot water, hollow feed-rolls mounted midway the length of the casing, and heated, and a supply-pipe for discharging liquid onto one of said heated feed-rolls, said supply-pipe containing a steam or hot-water pipe, whereby the same is kept heated; substantially as described.

4. In a machine of the character described, the combination with the means for compressing and severing the material, the severed material issuing from the discharge end of said machine, and a pipe for delivering a blast of cold air on the material as it issues from said discharge end; substantially as described.

5. In a machine of the character described, the combination with a casing, of a vibrating plunger therefor, a knife arranged on said casing, and means for operating said knife, the walls of said casing being formed converging beyond the stroke of the plunger to a point coincident with said knife, after which said walls are formed slightly diverging; substantially as described.

6. In a device of the character described, the combination with an inclosing casing, of a reciprocating plunger arranged therein, a reciprocating knife arranged in said casing, the walls of said casing beyond the stroke of the plunger being formed converging to a point coincident with said reciprocating knife, beyond which said walls are formed diverging, means for operating said plunger, means connected to said plunger and to said reciprocating knife for operating the latter, corrugated feeding and crushing rolls arranged in juxtaposition to a feed-opening formed in the casing, a conduit for delivering material to be fed to the machine to said corrugated rolls, a conduit for delivering a liquid onto said corrugated rolls whereby the first-mentioned material to be fed to the machine is caused to commingle and become saturated with said liquid, and a pipe designed to carry a heating agent arranged in said liquid-conduit for keeping the same in a heated liquid state; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 11th day of July, 1900.

WARREN A. PATTERSON.

Witnesses:
WM. H. SCOTT,
A. S. GRAY.