S. M. BALL, B. N. McNIEL & H. PENNINGTON.

MACHINE FOR COMPRESSING AND ROLLING BATS.

APPLICATION FILED JUNE 7, 1909.

961,997.

Patented June 21, 1910.

4 SHEETS—SHEET 1.

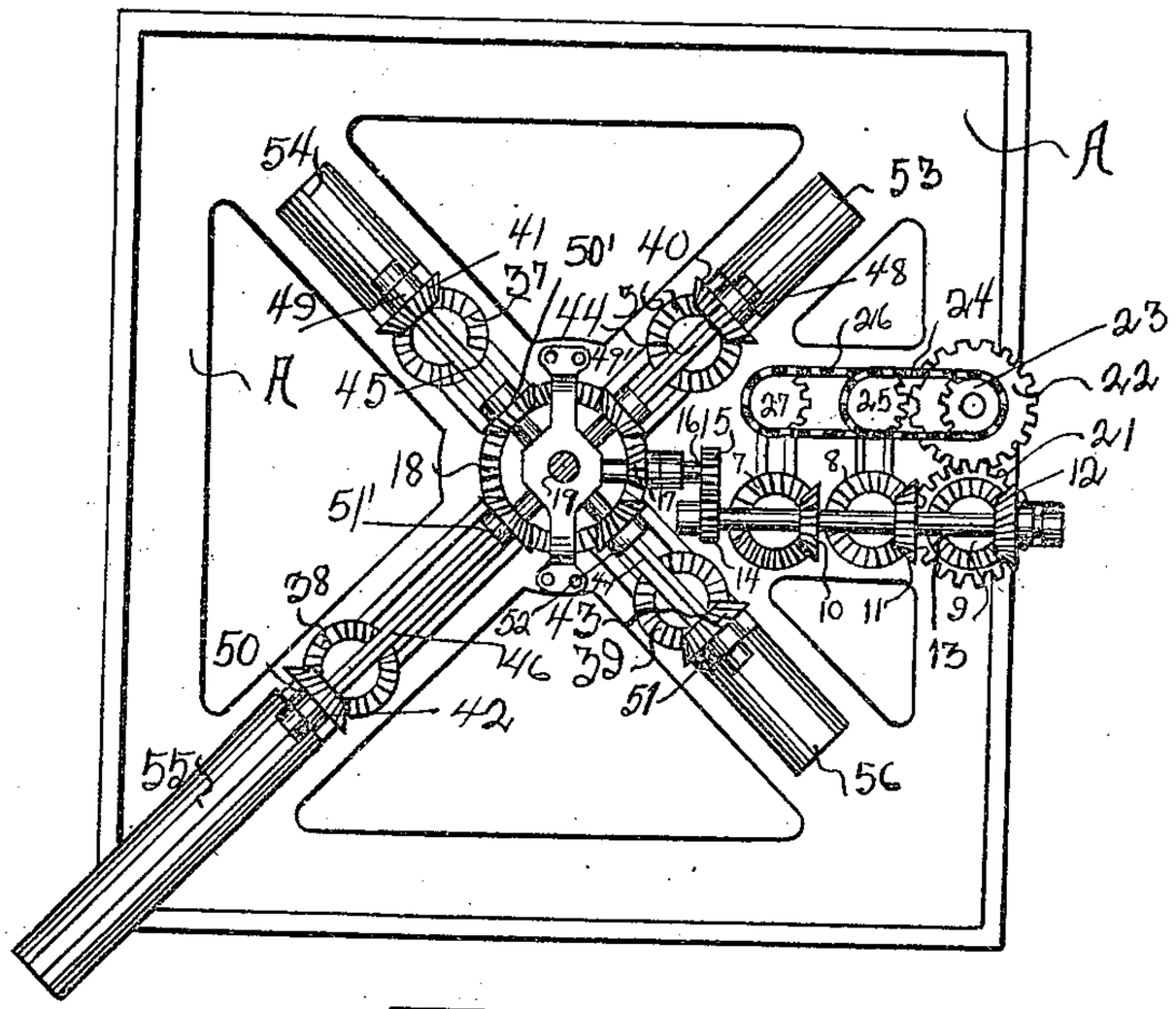

Fig 1

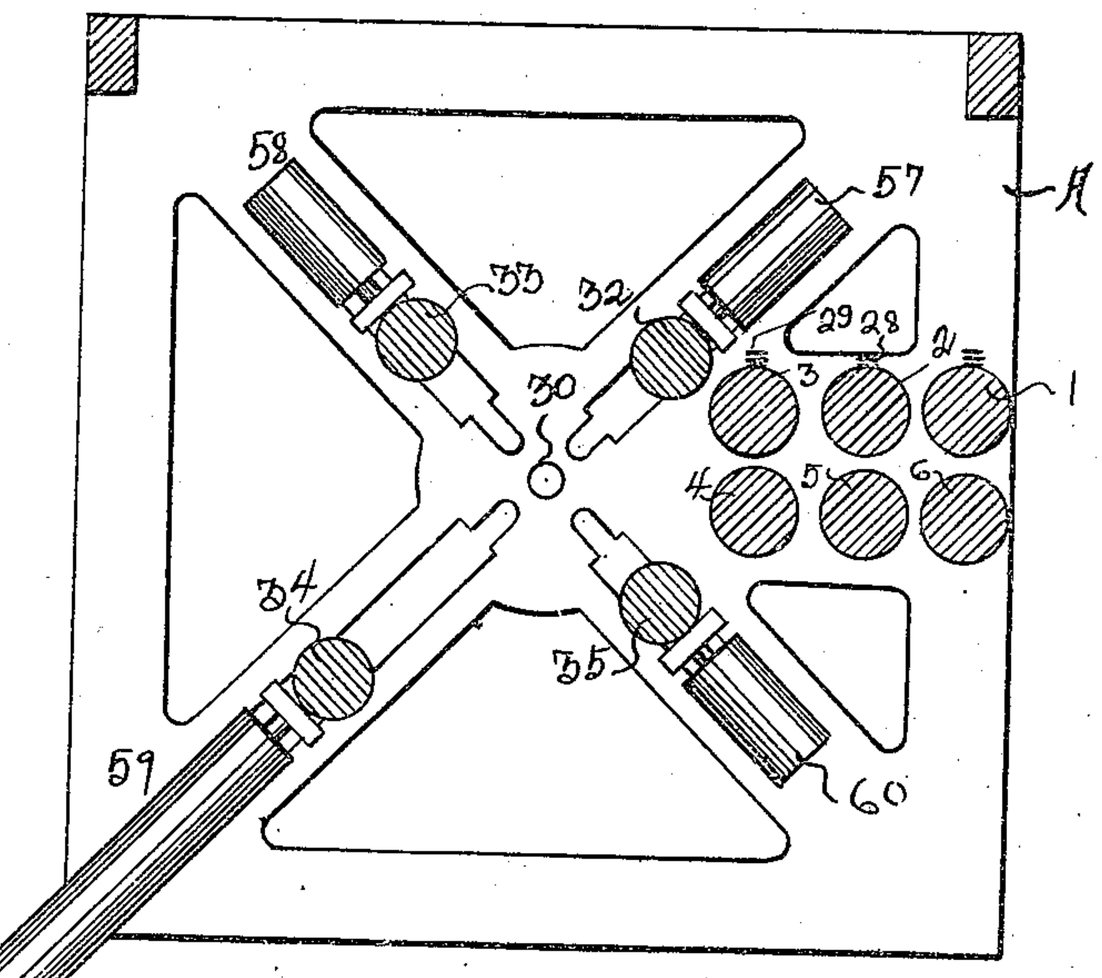

Fig 2.

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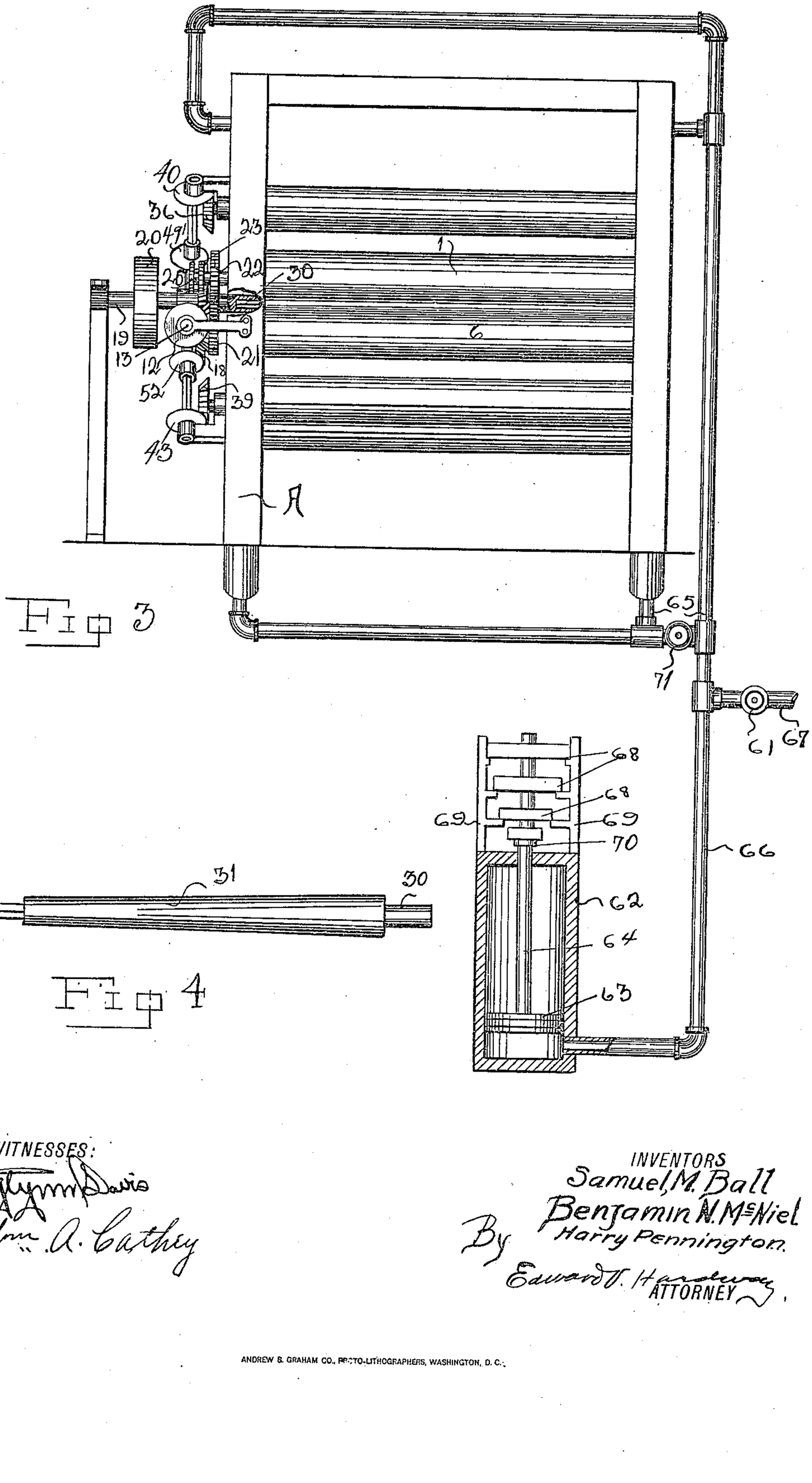

Fig 3

Fig 4

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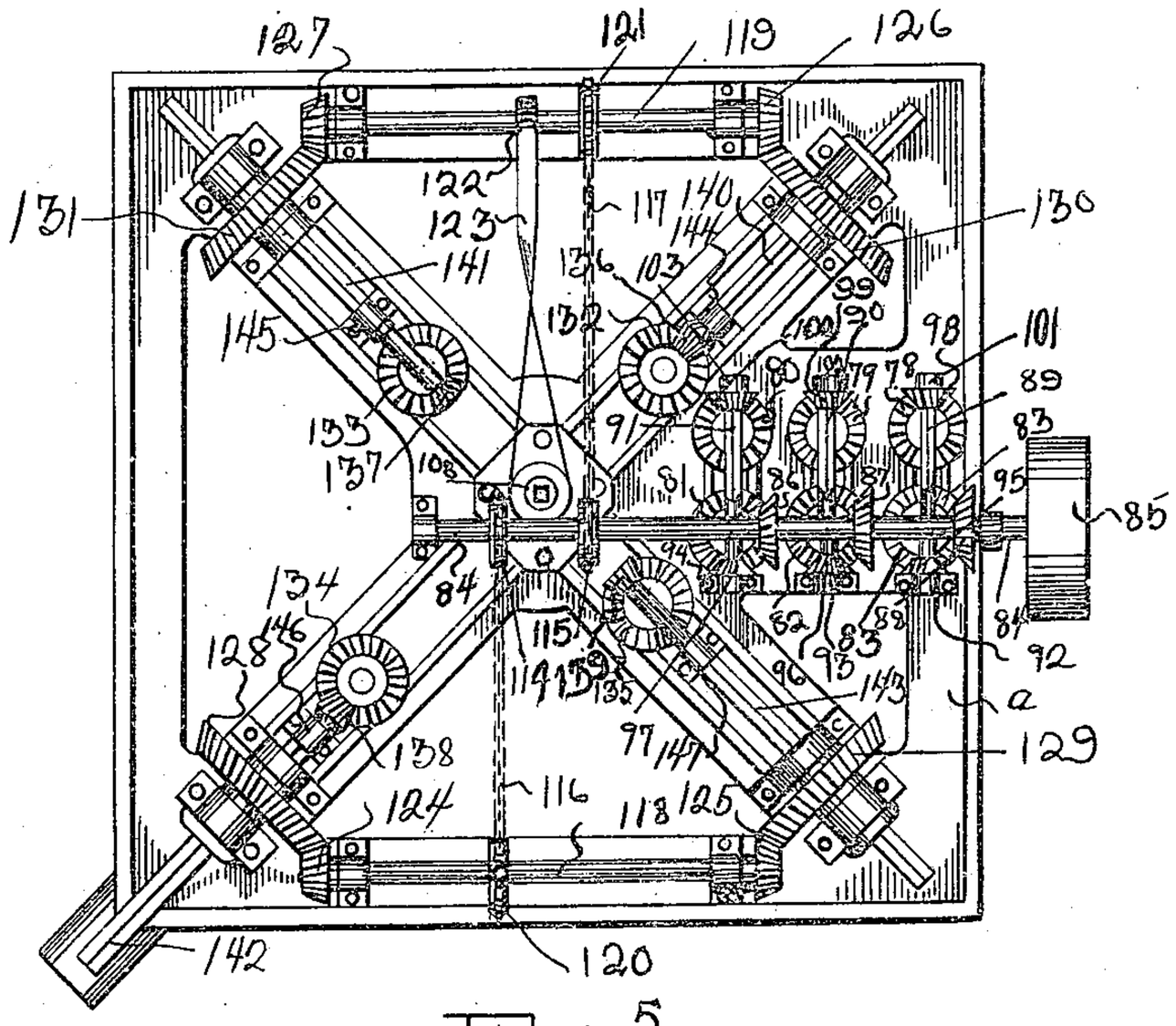

Fig 5

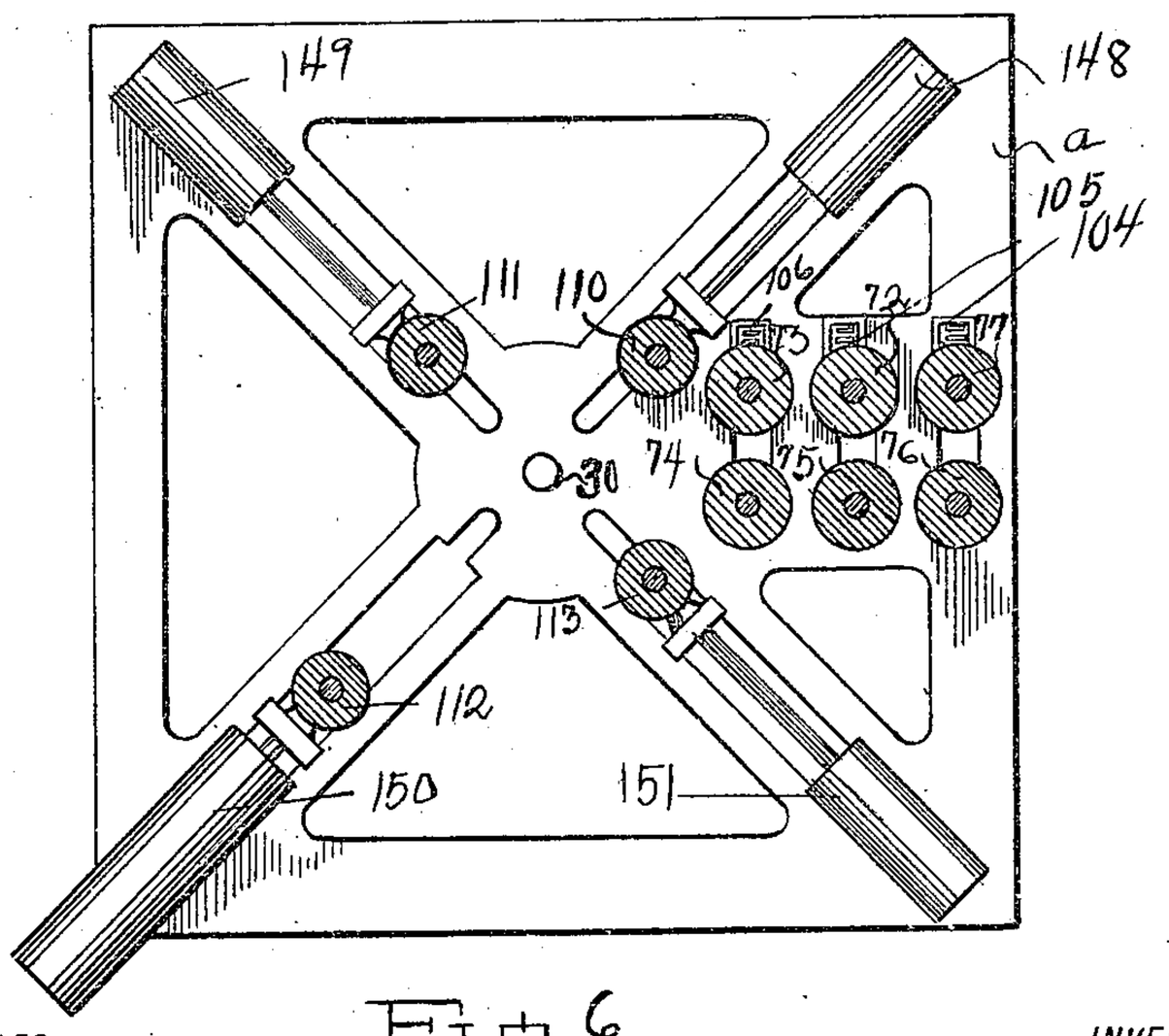

Fig 6

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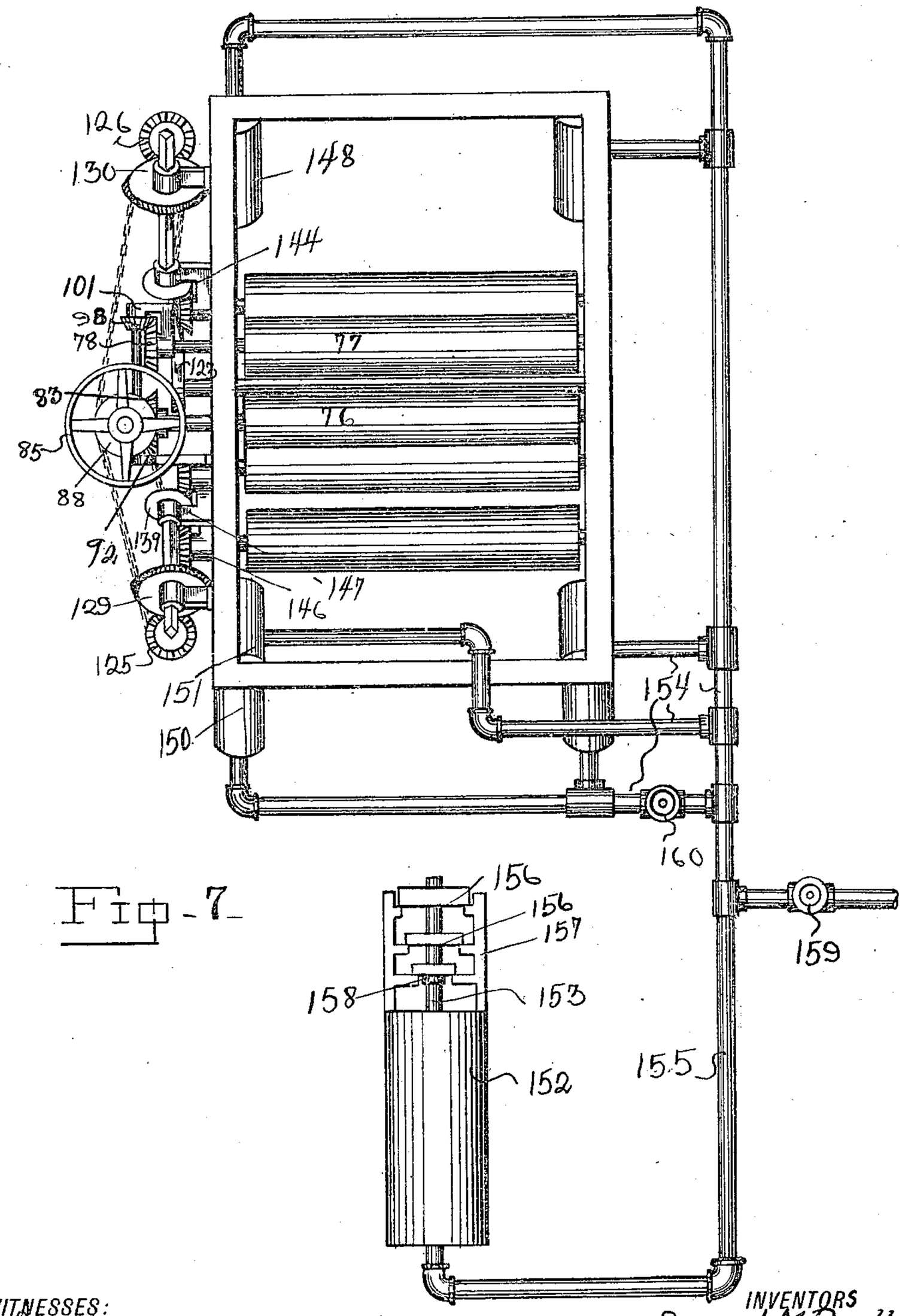

Fig-7-

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UNITED STATES PATENT OFFICE.

SAMUEL M. BALL, BENJAMIN N. McNIEL, AND HARRY PENNINGTON, OF HOUSTON, TEXAS.

MACHINE FOR COMPRESSING AND ROLLING BATS.

961,997. Specification of Letters Patent. **Patented June 21, 1910.**

Application filed June 7, 1909. Serial No. 500,573.

To all whom it may concern:

Be it known that we, SAMUEL M. BALL, BENJAMIN N. McNIEL, and HARRY PENNINGTON, citizens of the United States, residing at Houston, in the county of Harris and State of Texas, have invented certain new and useful Improvements in Machines for Compressing and Rolling Bats, of which the following is a specification.

Our invention relates to new and useful improvements in machines for compressing and rolling bats and more particularly to such machines as are designed to compress bats from cotton and similar materials and form the same into rolls.

The object of the invention is to provide a device of the character described whereby the bat may be compressed into a uniform and compact mass before being wound into a bale or package.

Another feature resides in the provision of means whereby pressure is exerted against the bale on all sides, from diametrically opposing points while the same is being formed, in such a manner as to compress the same weight of cotton into a bale of more uniform density throughout than the devices for the same purpose now in use.

A further feature resides in the provision of a mechanism whereby the amount of pressure exerted against the bale increases, automatically, as the bale increases in size, thus securing the uniform density of the bale.

A still further advantageous feature of our device resides in the provision of means whereby the bat is compressed before it enters into the press for being wound into a round bale or package. Upon the entry of the bat thus compressed into the press additional compression is provided for, thus insuring double compression by the distribution of the power applied into two or more compressing operations, and, as a result, requiring less power, as a whole, than the ordinary round bale press.

A still further feature of our device resides in the provision of means whereby a longitudinal opening may be maintained through the center of the bale after the same has been removed from the press.

Finally, the object of the invention is to provide a machine of the character described which will be simple in construction and efficient in operation, and one that will easily be kept in repair.

With the above and other objects in view, our invention has particular relation to certain novel features of construction and operation, an example of which is given in this specification, and illustrated in the accompanying drawings, wherein:—

Figure 1 is an end elevation of our device showing the operating mechanism. Fig. 2 is a sectional view taken on the line *a*—*a* of Fig. 3. Fig. 3 is a side elevation of the device. Fig. 4 is a detail of the core pin with a hollow roll core thereon. Fig. 5 is an end elevation of a modified form of the device. Fig. 6 is a sectional view of Fig. 7 taken on the line *b*—*b*. Fig. 7 is a side elevation of the modified form shown in Figs. 5 and 6.

Referring now more particularly to the drawings, wherein like characters of reference designate similar parts in each of the figures, the character A refers to the machine frame which is composed of suitable end members held together by suitable cross beams. Transversely disposed between these end members is a series of oppositely disposed compression rollers numbered respectively 1, 2, 3, 4, 5, and 6, one end of the shafts of which protrudes through the end member of the frame shown in Fig. 1.

The protruding ends of rollers 4, 5, and 6, carry, respectively, gear wheels 7, 8, and 9, which mesh with miter gears 10, 11, and 12, rigidly mounted on shaft 13, mounted in suitable bearings carried by the frame 1. This shaft, 13, carries a rigidly mounted pinion, 14, which meshes with pinion 15, carried by shaft 16, suitably mounted on the end member of Fig. 1. This shaft, 16, carries at its inner end a miter gear, 17, which meshes with a centrally located, power-transmitting gear wheel, 18, rigidly mounted on power shaft 19. This power shaft carries a suitable belt pulley, 20.

The shaft of roller 6 carries a spur gear, 21, which meshes with a similar spur gear, 22, carried by the shaft of roller 1, by means of which rotative motion is imparted to said roller 1. The shaft of roller 1 carries a sprocket wheel, 23, by means of which motion is imparted to roller 2 through sprocket chain 24, which

meshes with a suitable sprocket wheel, 25, carried by the shaft of said roller 2. This shaft carries also another sprocket wheel which communicates motion through chain 26 to sprocket wheel 27, rigidly mounted on the shaft of roller 3.

Through the mechanism just described rotative motion is imparted to all of the compression rollers.

It is to be observed that compression rollers 2 and 3 are adjustable toward and from their opposing rollers, 4 and 5, by reason of having their bearings slidably mounted in slots in the end members of the machine frame. These rollers, 2 and 3, are held yieldably against their opposing rollers by means of compression springs, 28 and 29, disposed as shown in Fig. 2, and similar and similarly arranged springs in the end member shown in Fig. 1, said springs operating against the respective bearings of their rollers. It is further to be observed that compression rollers 1 and 6 are located some little distance apart and may be made of wood as there is no great strain upon them; rollers 2 and 5 are situated somewhat closer together and are, preferably, made of cast iron to withstand the strain, while rollers 3 and 4 are located very close together, so as to compress the bat into a very compact mass before being wound into a bale and are, consequently, made, preferably, of steel as they must withstand great pressure. The bat passes between these rollers and is wound around the core pin, 30. This core pin is inserted through central openings in the end members of the frame and one end thereof, which is many sided, fits snugly into a correspondingly shaped recess in shaft 19, designed to operate said pin. By this mechanism a power driven core pin is provided, and the power is exerted from the beginning of the formation of the bale, until its completion, the core pin, however, being subject to removal at any stage of the formation of the bale, thus enabling the operator to remove said pin, or not, before the bale is completed according to his convenience and the requirements of the operation, thus obviating the necessity of an auxiliary device to start and continue to completion the formation of the bale. The pin also, carries a hollow core, 31, which fits thereover, in the manner of a sleeve, and which remains in the roll to preserve the opening therethrough, after the pin has been withdrawn.

As the bale is being formed on the core it is compactly compressed by means of roll compressors 32, 33, 34, and 35, the operation of which is hereinafter described. Each of the end members of the frame, A, of the machine is provided with four, corresponding, diagonally disposed braces radiating from the centers of said members. These braces are each provided with oblong longitudinal slots in which bearings of the shafts, extending from the opposing ends of the roll compressors 32, 33, 34, and 35 are slidably mounted. One end of each of these shafts extends beyond the end member as shown in Fig. 1, and, respectively, carry miter gears 36, 37, 38, and 39, rigidly mounted thereon. These gears mesh respectively with pinions 40, 41, 42, and 43 which are designed to slide upon their respective shafts, 44, 45, 46, and 47, and are held firmly in mesh with their respective gears by means of yoke blocks 48, 49, 50, and 51. Each of the pinions 40, 41, 42, and 43 and the corresponding arms of their respective yoke blocks are provided with square holes to receive the square shafts 44, 45, 46, and 47, and, together with their respective gear wheels and yoke blocks, the pinions are designed to slide back and forth upon said shafts. These shafts are not movable longitudinally but are revolubly mounted in suitable gearings, the inner ends revolving in bearings carried underneath yoke 48, and the outer ends revolving in suitable bearings carried by the end member A of Fig. 1. The inner ends of these shafts carry pinions 49′, 50′, 51′ and 52, rigidly mounted thereon, which mesh with gear wheel 18 and impart motion from it through the mechanism just described to the roll compressors.

It is readily obvious that the roll compressors will all be rotated in the same direction by the system of gears and pinions just described, and when forced against the bale, in the manner presently to be described, will not only assist in rotating it, but will compactly compress the same.

For the purpose of forcing the roll compressors against the bale, we have provided cylinders 53, 54, 55, and 56, carried by the end members shown in Fig. 1, and corresponding cylinders 57, 58, 59, and 60, carried by end member shown in Fig. 2. These cylinders are all radially disposed, corresponding in position to the diagonal braces of their supporting end members. The cylinders are provided with pistons, operating in the usual manner, and whose rods extend inwardly toward the center of their end members and operate against the respective bearings of the shafts of the roll compressors.

Suitable means, shown in Fig. 3, is provided for introducing fluid pressure behind the pistons in said cylinders and thereby forcing the roll compressors against the bale. When sufficient pressure has been introduced behind said pistons, the valve 61, controlling said pressure, is closed. As the bale increases in size it tends to force the roll com-

pressors back, and in order to permit this backward movement of said compressors, we have provided a pressure regulator shown in detail in Fig. 3. This regulator includes an upright cylinder, 62, which carries the usual piston, 63, and piston rod, 64; it also includes a system of pipes, 65, leading from behind the pistons of the cylinders, carried by the frame of the machine, and uniting in a single pipe, 66, communicating with cylinder 62.

When it is desired to introduce pressure behind the roll compressors, fluid, under pressure, is admitted through inlet pipe 67, and is transmitted through pipes 65 to the cylinders carried by the machine frame. When this pressure is sufficiently great, valve 61 is closed and the fluid supply cut off. As the bale increases in size, the roll compressors are forced back and an increased pressure consequently exerted behind piston 63, through pipe 66, and piston rod 64 consequently raised. This piston rod extends loosely through a series of weights, 68, the lower one of which is the smallest in diameter, and which gradually increases, in diameter, upward. These weights are supported upon a framework, 69, carried by the cylinder 62, as shown. The piston rod, 64, is provided with a collar, 70, which engages with the lower weight and raises the same, thereby increasing, to an extent, the resistance to pressure behind the piston, 63. As the bale continues to increase and the piston rod 64 continues to rise by reason of the consequent pressure, the next succeeding weight is picked up and the pressure further resisted. This process continues until all of the weights are picked up. It is readily apparent that as the bale increases in diameter, the roll compressors will be forced back and the pressure to be overcome will be gradually increased in accordance with the size and number of the weights picked up by piston rod 64. The size and number of these weights may be varied as is desired and thus the pressure exerted against the forming bale regulated at will. When the bale is formed of a suitable size all pressure is relieved from behind the pistons of the cylinders carried by the machine frame by opening three-way valve, 71, and allowing the fluid in pipes 65 to escape. The cylinder 55 and its oppositely disposed cylinders are elongated, in order to allow their pistons and rods and the compression roller 34, connected therewith to be withdrawn from the bale a sufficient distance to allow the same to be removed. The core pin may be withdrawn at the operator's convenience after the bale has attained a sufficient size to come into contact with the compression rollers and the bale on completion is allowed to fall out between compression rollers 33 and 34, onto a suitable platform provided for the purpose, and to be removed. The fluid wasted through valve 71 may be replaced, by means of a force pump, through pipe 67.

In Figs. 5, 6, and 7 we have shown a modified form of our machine, the description of which is as follows:—Transversely disposed between these end members is a series of oppositely disposed compression rollers numbered respectively, 72, 73, 74, 75, 76, and 77, one end of the shafts of which protrude through the end member of the frame shown in Fig. 5, and carry gear wheels, respectively numbered 78, 79, 80, 81, 82, and 83, rigidly mounted thereon. Upon the end member shown in Fig. 5 a drive shaft, 84, is mounted. This drive shaft carries a suitable drive wheel, 85, and is further provided with miter gears, 86, 87, and 88, rigidly mounted thereon, which are designed to mesh with gears 81, 82, and 83, and to impart motion thereto, and to compression rollers, 74, 75, and 76. Above these gears carried by the shafts of the compression rollers, are transverse shafts, 89, 90, and 91. These shafts operate at one end, in stationary bearings, 92, 93, and 94, and carry, at said end, miter gears 95, 96, and 97, rigidly mounted thereon, which mesh with gears 80, 81, and 82, and receive motion therefrom and impart the same, through said shafts, to the gears carried by the shafts of compression rollers 72, 73, and 74, and consequently to said rollers. The motion is imparted from said transverse shafts to the gears carried by the shafts of compression rollers 72, 73, and 74, through gears 98, 99, and 100, slidably mounted on said transverse shafts. These shafts are, preferably, square, and pass loosely through square holes in said slidable gears, as well as through yoke blocks, 101, 102, and 103. The shafts of the compression rollers, 72, 73, and 74, extend through these yoke blocks in the manner shown in Fig. 7, and these gears are thereby always held in mesh.

It is to be observed that compression rollers, 75, 76, and 77, are not movable laterally, while their opposing rollers, 72, 73, and 74, are adjustable toward and from said rollers by reason of having their bearings slidably mounted in slots in the end members of the machine frame. These rollers, 72, 73, and 74, are held yieldably against their opposing rollers by means of compression springs, 104, 105, and 106, disposed as shown in Fig. 6, and similar and similarly arranged springs operating against the yoke blocks, 101, 102, and 103 of Fig. 5. It is further to be observed that compression rollers 72, and 75, are located some little distance apart and may be made of wood,

as there is no great strain upon them; rollers 73, and 76 are situated somewhat closer together and are preferably made of cast iron to withstand the strain, while rollers 74 and 77 are located very close together, so as to compress the bat into a very compact mass before being wound into a bale and are consequently made, preferably, of steel as they must withstand great pressure. After the bat leaves the compression rollers it is wound around the core pin, 30, shown in detail in Fig. 4. This core pin is inserted through central openings in the end members of the frame and the end thereof which is, preferably, square, fits snugly into a square hole in pulley 108, designed to operate said pin. It also carries a hollow core, 31, which fits thereover, in the manner of a sleeve, and which remains in the roll to preserve the opening therethrough, after the pin has been withdrawn. As the bale is being formed on the core pin it is compactly compressed by means of roll compressors, 110, 111, 112, and 113, the operation of which is hereinafter described.

Rigidly mounted upon the drive shaft 84 are two sprocket wheels, 114, and 115, which respectively drive the sprocket chains 116 and 117, which in turn transmit rotative motion to counter shafts 118 and 119 through sprocket wheels 120 and 121, rigidly mounted upon said counter shafts respectively. The counter shaft 118 carries a pulley wheel, 122 which operates a cross belt, 123, through which rotation is imparted to pulley wheel 108 and consequently to the core pin, 30. The counter shafts, 118 and 119 are mounted upon the end member of the frame, shown in Fig. 5, by suitable bearings, and carry, at their extremities, pinions numbered 124 and 125, and 126 and 127, respectively. These pinions mesh, respectively with miter gears 128, 129, 130, and 131, mounted in suitable stationary bearings upon the frame as shown in Fig. 5.

It is to be observed that each of the end members of the framework of the machine is provided with four corresponding, diagonally disposed braces radiating from the center of said members. These braces are each provided with oblong longitudinal slots in which bearings of the shafts extending from the opposing ends of roll compressors 110, 111, 112, and 113, are slidably mounted. One end of each of these shafts extends beyond the end member as shown in Fig. 5, and, respectively, carry miter gears 132, 133, 134, and 135, rigidly mounted thereon. These gears mesh respectively with pinions 136, 137, 138, and 139, rigidly mounted upon shafts 140, 141, 142, and 143, which are mounted in suitable bearings upon said diagonal braces, extend longitudinally thereof, and upon which the gears 128, 129, 130, and 131, respectively, are loosely mounted. These shafts are preferably square, and fit into corresponding square holes in said last-mentioned gears. The pinions 136, 137, 138, and 139, are held firmly in mesh with their respective gears by means of yoke blocks 144, 145, 146, and 147, and each pinion and its respective gear and yoke block move toward and from the center of the frame as a unit, the shaft carrying the pinion sliding through its bearing and also through the gear wheel, loosely mounted thereon.

It is readily obvious that the roll compressors will all be rotated in the same direction by the system of gears and pinions just described, and when forced against the bale in the manner presently to be described, will not only assist in rotating it, but will compactly compress the same.

For the purpose of forcing the roll compressors against the bale, we have provided cylinders 148, 149, 150, and 151, carried upon the inner side of the end member shown in Fig. 6, and corresponding cylinders carried upon the inner side of end member shown in Fig. 5. These cylinders are all radially disposed, corresponding in position to the diagonal braces of their supporting end members. These cylinders are provided with pistons, the rods of which extend inwardly toward the center of their end members and connect with the respective bearings of the shafts of the roll compressors. Suitable means, (shown in Fig. 7), is provided for introducing fluid pressure behind the pistons in said cylinders and thereby forcing the roll compressors against the bale. When sufficient pressure has been introduced behind said pistons, the valve controlling said pressure is closed. As the bale increases in size, it tends to force the roll compressors back; and in order to regulate this backward movement of said compressors, we have provided a pressure regulator shown in detail in Fig. 7. This regulator includes an upright cylinder, 152, which carries the usual piston and rod, 153; it also includes a system of pipes, 154, leading from behind the pistons of the cylinders, carried by the frame of the machine, and uniting in a single pipe, 155, communicating with cylinder 152. As the bale increases in size the pressure against the roll compressors, increases and, with valve 159 closed, is transferred to cylinder 152, and its piston and piston rod consequently raised. This piston rods extends through a series of weights, 156, which are supported upon a frame work, 157, carried by the cylinder 152, as shown. The piston rod, 153, is provided with a collar, 158, which engages with the lower weight and raises the same, thereby increasing, to an extent,

the resistance to pressure behind the piston operating in cylinder 152. As the bale continues to increase and the piston rod, 153, continues to rise by reason of the consequent pressure, the next succeeding weight is picked up and the pressure further resisted. This process continues until all the weights are picked up. It is readily apparent that as the bat roll increases in diameter, the roll compressors will be forced back and the pressure to be overcome will be gradually increased in accordance with the size and number of the weights picked up by piston rod 153. The size and number of these weights may be varied as is desired and thus the pressure exerted against the forming bat roll regulated at will.

When the bale is formed of a suitable size all pressure is relieved, from behind the pistons of the cylinders carried by the machine frame by opening valve 160 and allowing the fluid to waste. The cylinder 150 and its oppositely disposed cylinder are made longer than the other cylinders, in order to allow their pistons and rods and the compression roller 112, connected therewith to be withdrawn from the bale a sufficient distance by opening three-way valve 160 and allowing the fluid contained in the cylinders to waste, to allow the same to be removed. The core pin is withdrawn at the operator's convenience after the bale becomes of sufficient size to come into contact with compression rollers and the bale on completion is allowed to fall out between compression rollers 40 and 41, onto a platform and to be removed.

A machine for compressing and rolling bats, constructed in accordance with the foregoing description, and drawings accompanying the same, and made a part thereof, will be found capable of compressing the same amount of cotton, etc., into a bale of more uniform density than similar machines now in common use; and will also be found to possess the two prime virtues desired to be attained, to wit:—simplicity and inexpensiveness of construction, and ease of operation.

What we claim is:—

1. In a machine of the character described, a supporting frame, bat compressors carried thereby, a mandrel also carried by said frame and disposed to receive the bat from said compressors, a means for driving said mandrel, said driving means also having operative connection with said bat compressors and driving the same, a plurality of bale compressors surrounding said mandrel and adjustable radially toward and from the same, said bale compressors also having operative connection with said mandrel-driving-means and being driven thereby, compression cylinders radially disposed relative to said mandrel and provided with pistons having connection with said bale compressors, a means for introducing hydraulic pressure in each of said cylinders, behind said pistons simultaneously, and means for gradually increasing the resistance of the bale compressors to the increasing bale.

2. In a machine of the character described a supporting frame, a series of bat compressors carried thereby, a mandrel carried by said frame and disposed to receive the bat and roll the same into a bale, a plurality of bale compressors surrounding said mandrel and adjustable radially toward and from the same, a driving mechanism for operating said mandrel and operatively connected with the bat compressors and the bale compressors for rotating the same, compression cylinders carrying pistons which operate against the bale compressors and tend to hold them against the mandrel, means for introducing hydraulic pressure within the cylinders behind the pistons and a hydraulic device for gradually increasing the resistance of the bale compressors against the bale as the size of said bale increases.

3. In a machine of the character described a supporting frame comprising two opposing side members secured together by suitable connecting members, a series of bat compressors carried thereby, a mandrel carried by said frame and disposed to receive the bat from said compressors and roll the same into a bale, a plurality of bale compressors surrounding the mandrel and adjustable radially toward and from the same, a driving mechanism for operating said mandrel and operatively connected with the bat compressors for rotating the same, compression cylinders carried by said side members, and being provided with pistons which operate against each end of said bale compressors and tend to hold them against the mandrel, means for introducing hydraulic pressure within the cylinders behind the pistons and a graduating device having connection with said last mentioned means whereby the resistance of said pistons against the bale compressors is gradually and automatically increased as the bale increases in size.

4. In a machine of the character described a supporting frame, a series of bat compressors carried thereby, a mandrel carried by said frame and disposed to receive the bat and roll the same into a bale, a plurality of bale compressors surrounding said mandrel and adjustable radially toward and from the same, a driving mechanism for operating said mandrel and operatively connected with the bat compressors and the bale

compressors for rotating the same, two compression cylinders carrying pistons which operate against each bale compressor and tend to hold it against the mandrel, means for introducing hydraulic pressure within the cylinders behind the pistons and a hydraulic device for gradually increasing the resistance of the bale compressors against the bale as the size of said bale increases.

In witness whereof, we have hereto set our hands on this the 29th day of May, A. D. 1909.

SAMUEL M. BALL.
BENJAMIN N. McNIEL.
HARRY PENNINGTON.

In the presence of—
WM. A. CATHEY,
C. DODSON.