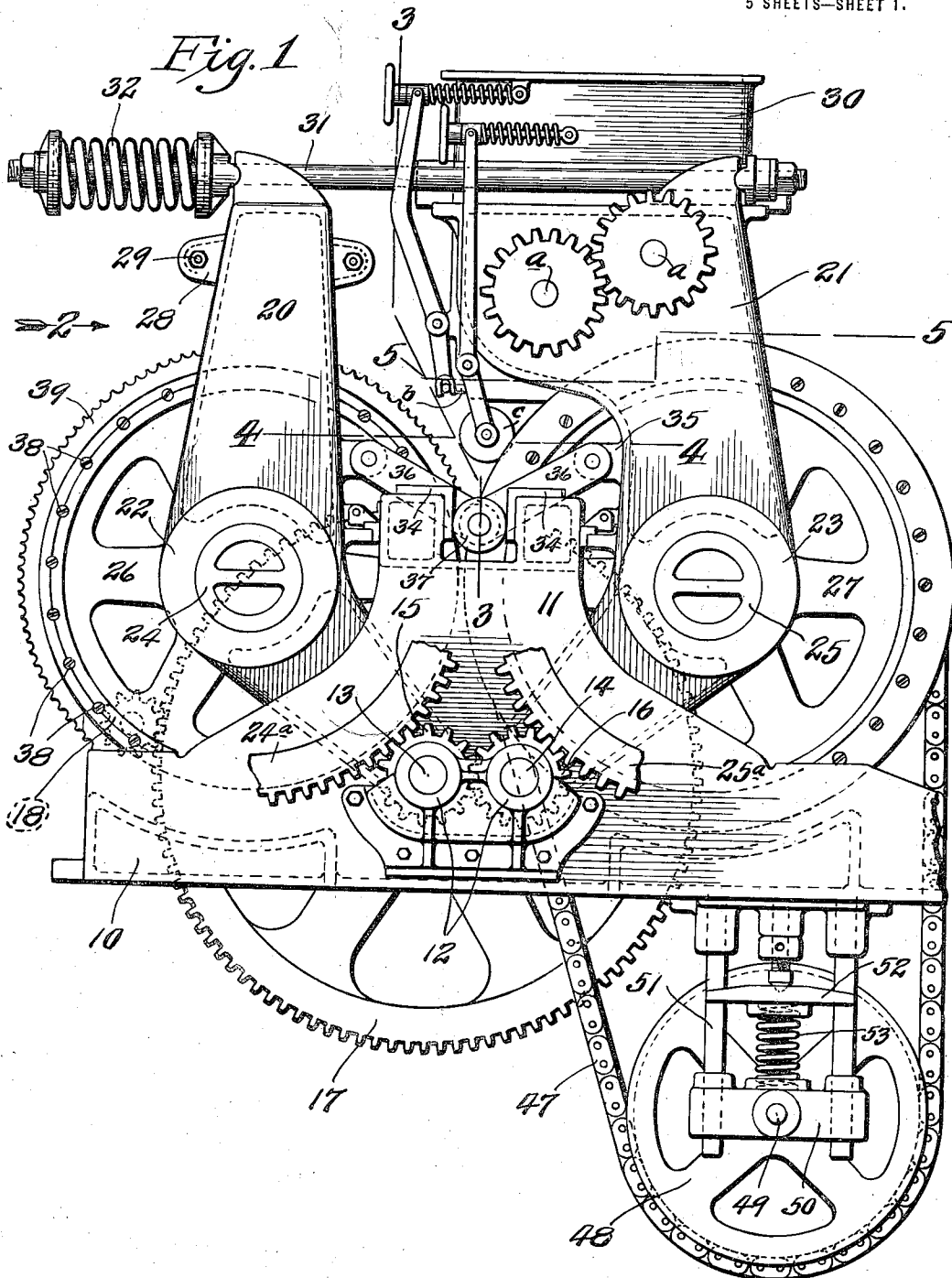


G. KOMAREK.
BRIQUET MACHINE.
APPLICATION FILED FEB. 5, 1918.

1,295,764.

Patented Feb. 25, 1919.

5 SHEETS—SHEET 1.



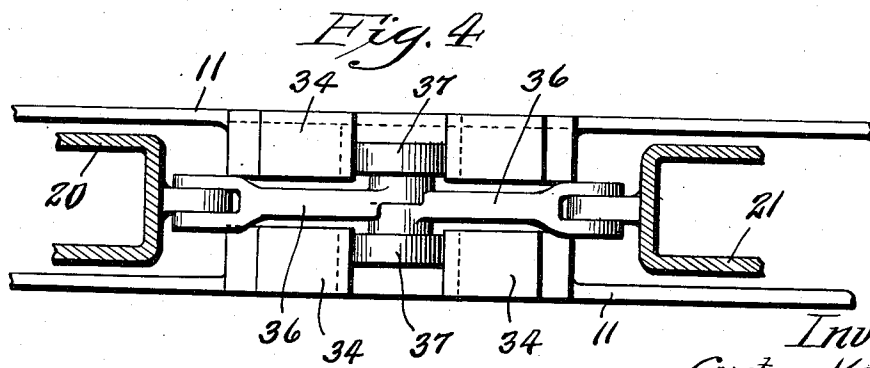
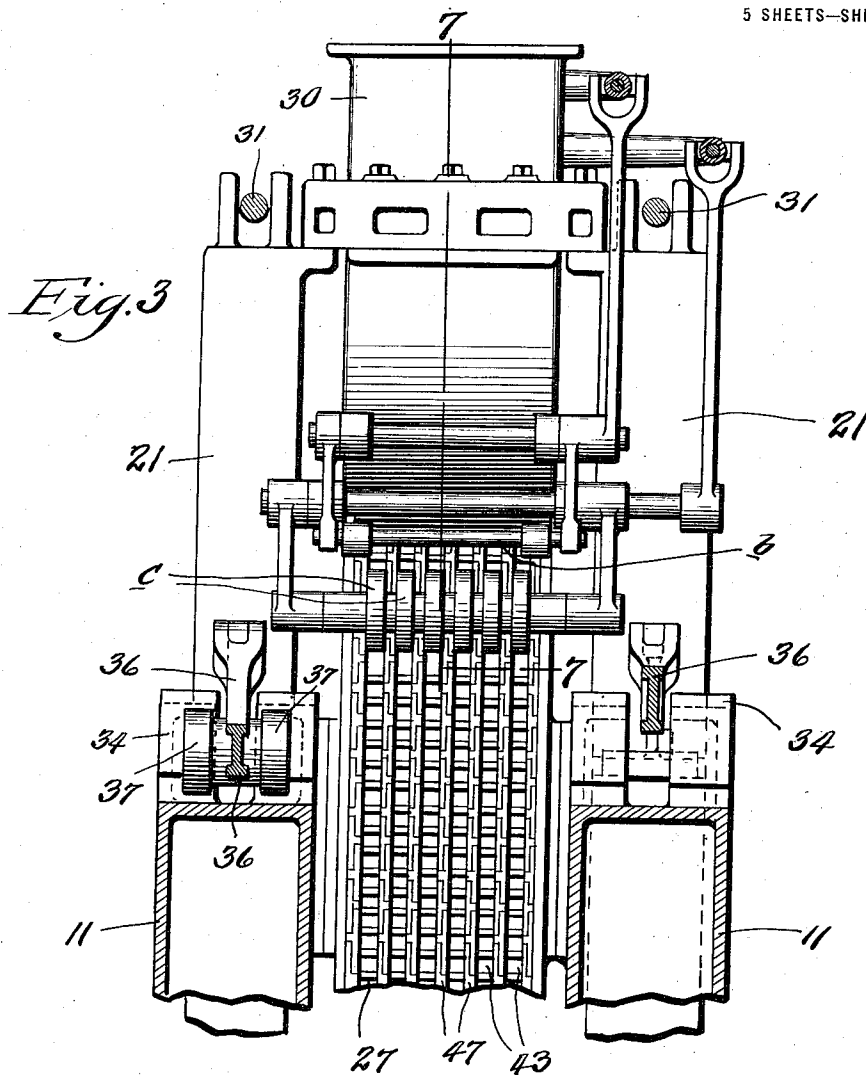
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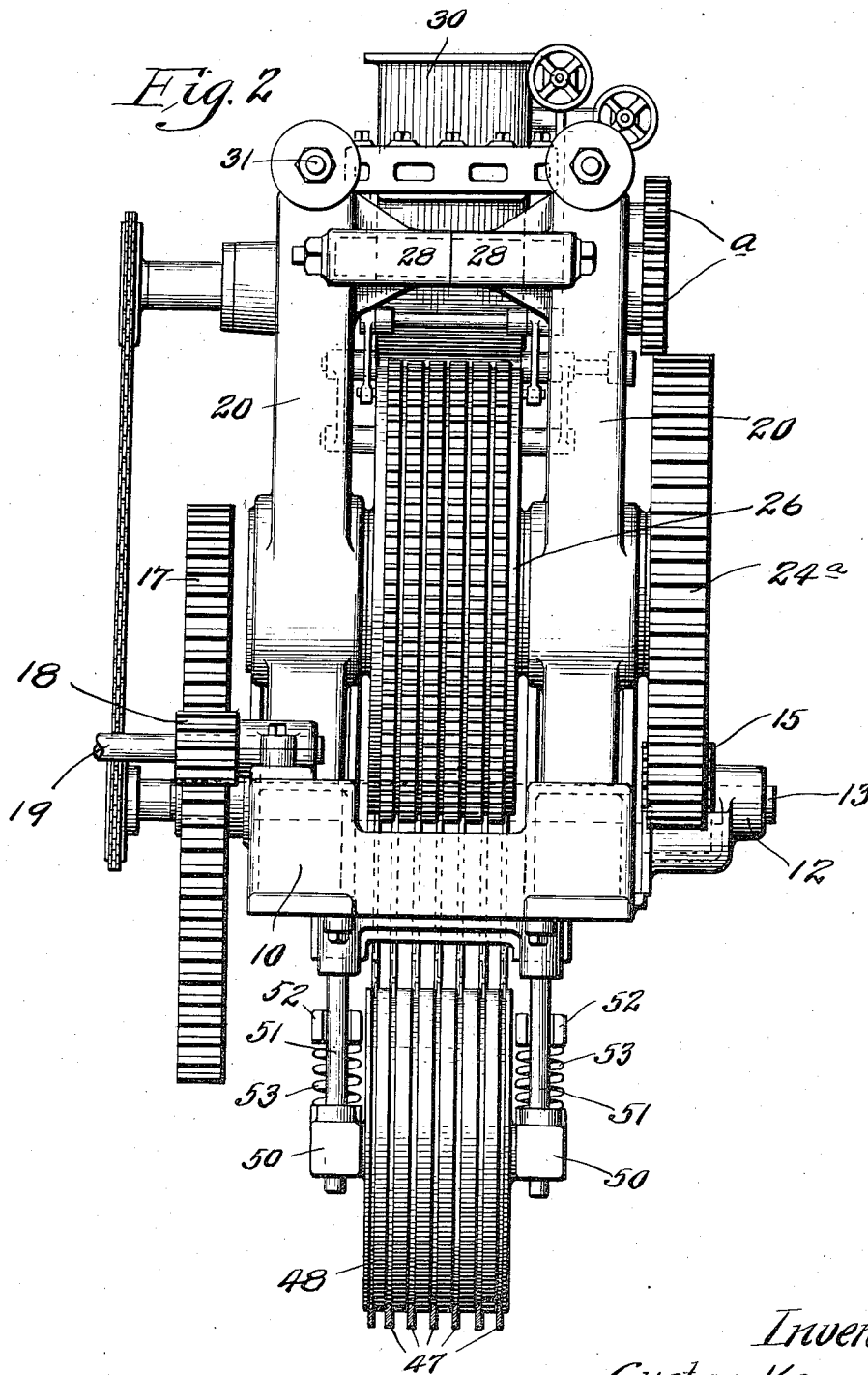
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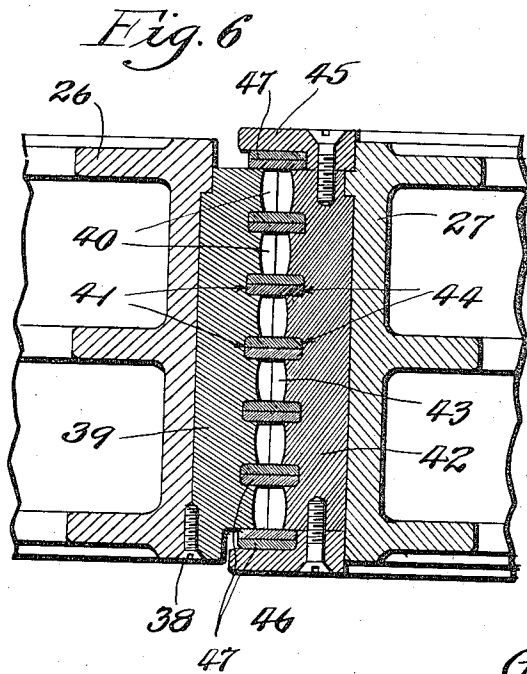
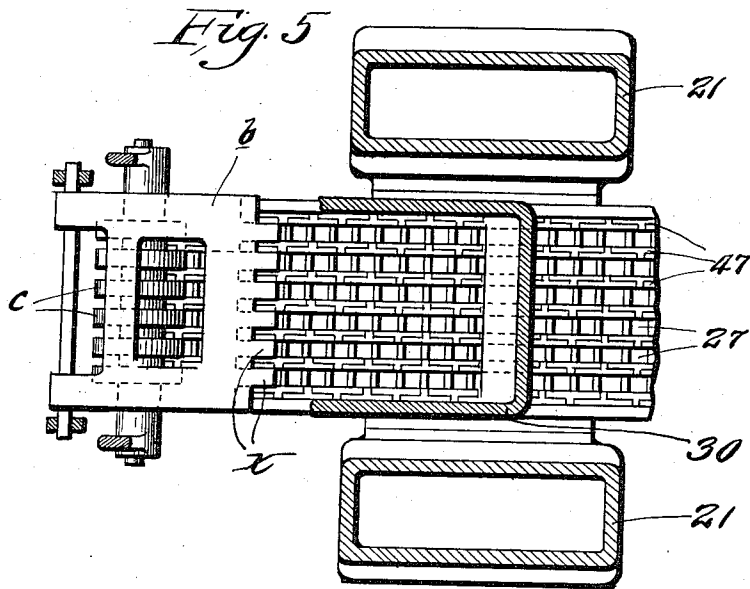
5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 4.

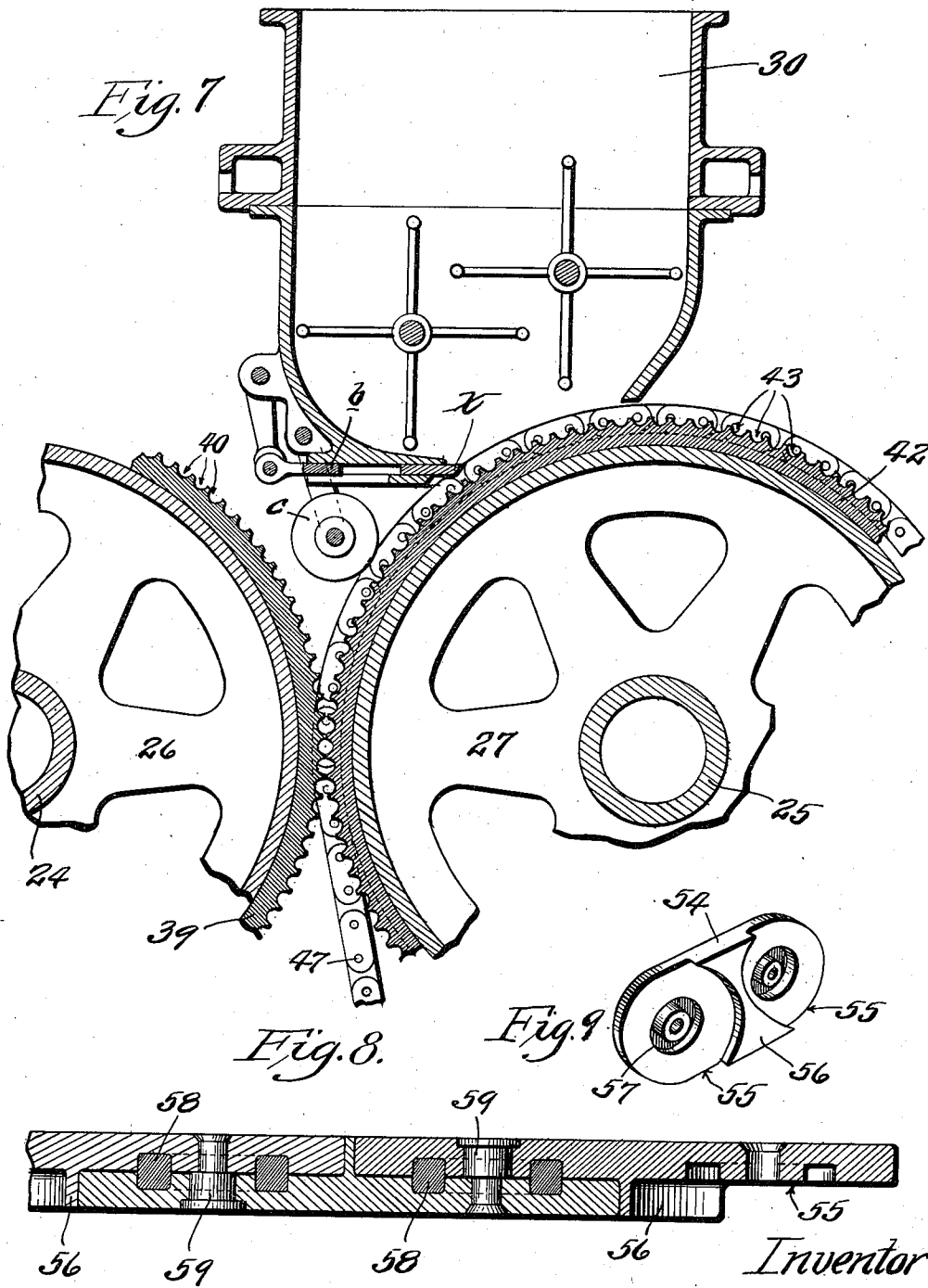


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Patented Feb. 25, 1919.
5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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BRIQUET-MACHINE.

1,295,764.

Specification of Letters Patent.

Patented Feb. 25, 1919.

Application filed February 5, 1918. Serial No. 215,445.

To all whom it may concern:

Be it known that I, GUSTAV KOMAREK, a citizen of the United States, residing at the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvement in Briquet-Machines, 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.

My invention relates to that class of machines in which pulverized combustible material in plastic or semi-plastic condition is compressed between revolving cylinders or drums to form fuel briquets and my present invention is an improvement on a machine of similar type U. S. Letters Patent, No. 1,164,822, for which was issued to my assignee December 21, 1915.

The principal objects of my present invention are to generally improve upon and simplify the construction disclosed in the patent aforesaid; to provide improved and positively acting means for maintaining absolute alinement between the mold cavities in which the briquets are formed; to provide improved means whereby the feed of briqueting material to the mold cavities can be accurately regulated and controlled, even though the plasticity of said material should vary while the machine is in operation; to provide endless flexible members preferably in the form of chains having flat links and serving as the end walls for the mold cavities; to provide for the neutralizing of all stresses impressed on the parts which cooperate to form the briquets, thereby minimizing the wear upon said parts and producing briquets which have uniform density throughout their bodies; to arrange the chains which form the end walls of the mold cavities so that they will maintain the same positions relative to the mold rings for a short period of time immediately after the briquets have been subjected to highest pressure, thereby minimizing the wear upon the chains and likewise minimizing the percentage of breakage of the briquets; and further, to provide a simple and effective compensating device for maintaining an equal amount of tension on the chains, which action is desirable due to the fact that the

chains gradually become heated and consequently expand during the continued operation of the parts.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts hereinafter more fully described and claimed and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevational view of a briquet press of my improved construction, parts thereof being broken away for the purpose of clearer illustration.

Fig. 2 is an elevational view of a machine looking in the direction indicated by the arrow 2 in Fig. 1.

Fig. 3 is an enlarged vertical section taken approximately on the line 3—3 of Fig. 1.

Fig. 4 is an enlarged horizontal section taken approximately on the line 4—4 of Fig. 1.

Fig. 5 is a horizontal section taken approximately on the line 5—5 of Fig. 1.

Fig. 6 is a detail horizontal section taken through portions of the drums of the machine and showing the mold cavities in the peripheries of said drums and the chains which constitute the end walls of said mold cavities.

Fig. 7 is an enlarged vertical section taken approximately on the line 7—7 of Fig. 3.

Fig. 8 is a detail section taken lengthwise through the center of a portion of one of the chains forming a part of my improved press.

Fig. 9 is a perspective view of one of the links of the chain.

Referring by numerals to the accompanying drawings which illustrate a practical embodiment of my invention, 10 designates a base casting the sides of which are provided with upwardly projecting housings 11, and formed near the center of said base casting, are bearings 12 in which are journaled comparatively large and heavy shafts 13 and 14. These shafts are geared together by pinions 15 and 16 so that they will operate simultaneously and at the same speed, and fixed on the projecting end of shaft 13 is a comparatively large gear wheel 17. This latter gear wheel is driven from a pinion 18, the latter being carried by a power shaft 19. Loosely mounted on the shafts 13 and 14 and disposed between the

housings 11, are upwardly and outwardly projecting pairs of frames or levers 20 and 21 which are provided respectively with bearings 22 and 23 for the trunnions 24 and 25 of drums 26 and 27. Fixed on the trunnions 24 and 25 are large gear wheels 24^a and 25^a, the same meshing with the pinions 15 and 16 respectively. The upper portions of the levers or frames 20 are connected by cross members 28 and transversely disposed tie rods 29, and the upper portions of the levers or frames 21 are connected by a feed box or hopper 30, the construction and operation of which latter is fully disclosed in my copending application filed November 28, 1917, Serial No. 204,368.

The upper portions of the frames or levers 21 are connected to the upper portions of frames or levers 20 by horizontally disposed rods 31, and positioned on each of these rods is a comparatively heavy compression spring 32, the same being arranged so as to normally and with yielding pressure force the upper portions of the frames or levers 20 and 21 toward each other, and consequently, resisting any tendency of said frames or levers to swing outwardly away from each other.

It will be understood that the material feeding box 30 is provided with interiorly arranged stirrers or agitating members, which latter are carried on shafts *a* which pass through the box, and that the lower portion of said box is equipped with a manually adjustable plate *b* which controls the amount of briqueting material fed into the mold cavities on drum 27, and further, that said box is equipped with a series of rollers *c*, which latter press the briqueting material into the mold cavities before the latter reach the point of highest pressure.

Formed in the upper portion of each housing 11 is a recess or pocket 33, and located on the housing and extending downwardly into said pocket and at the sides thereof, are wear plates 34. Pivotaly secured to lugs or brackets 35 which project toward each other from the inner faces of the arm or levers 20 and 21, are the outer ends of links 36, the inner ends thereof being pivotaly connected to each other and carrying rollers, such as 37, the latter being mounted for vertical travel between the wear plates 34. These pairs of links 36 and rollers 37 constitute equalizing devices which in operation insures uniform and corresponding movement between the pairs of levers 20 and 21, and any appreciable movement of one pair of levers will be immediately and correspondingly imparted to the other pair, and as a result perfect alinement between the corresponding pairs of mold cavities is maintained.

Removably positioned on the periphery of drum 26 and clamped in position by means

of screws 38 or like devices, is a mold ring 39 preferably formed of hardened metal and provided in its periphery with circumferentially disposed rows of substantially concave mold cavities or pockets 40, said rows being separated by circumferentially disposed grooves 41. Removably positioned on the periphery of drum 27 is a hardened metal mold ring 42, the same being provided in its periphery with circumferentially disposed rows of mold cavities 43, which latter coincide with the cavities 40. Disposed between these rows of mold cavities 43 are circumferentially disposed grooves 44, the same being positioned directly opposite to the corresponding grooves 41. This mold ring 42 is clamped to or secured in position upon drum 27 by side rings 45, which latter are removably secured in any suitable manner to the body of drum 27, and formed in these side rings 45 are circumferentially disposed grooves 46.

Passing over drum 27 and occupying the pairs of grooves 41 and 44 and the grooves 46, are chains 47 made up of flat links as hereinafter described, and which chains constitute the end walls for the mold cavities 40 and 43. These chains 47 are endless and extend downward from drum 27 and pass around a grooved drum or pulley 48, the latter being carried by a shaft 49 which is journaled in boxes 50. These boxes are arranged for sliding movement upon posts 51 which are fixed to and depend from the base frame 10, and adjustably arranged between the upper portions of each pair of posts is a sliding block 52. Interposed between each of these blocks and the corresponding box 50 is a comparatively heavy compression spring 53. These springs normally exert downward pressure against the boxes 50, thereby forcing shaft 49 and drum 48 downward, with the result that all of the chains 47 are maintained under a certain degree of tension even though they become heated and expand while in service. The shaft 49 carrying the drum 48 is offset a substantial degree with respect to the vertical plane occupied by the axis of the drum 27, and by virtue of such arrangement and the fact that drum 48 is considerably smaller in diameter than drum 27, the inner portion of the chains 47 or that portion traveling downward from a point between the two mold ring carrying drums to the inner side of drum 48 is inclined, as illustrated in Figs. 1 and 7, with the result that the chains after passing the line of highest pressure given to the briquets or a horizontal line drawn through the axes of drums 26 and 27 maintain their positions in the grooves 41 and 44. In other words the chains maintain their relative positions with respect to the mold cavities for a short distance after passing below the line of highest pressure, which action is effective in re-

lieving the chains of wear due to lateral stresses of the pressure imparted to the briquets.

As illustrated in Figs. 8 and 9, each chain 5 is made up of a series of flat links 54, the outer faces of which are perfectly smooth and the inner faces being cut away at both ends, as designated by 55, in order to accommodate the end portions of the next adjacent links. Such construction leaves a transversely disposed rib 56 on the inner face of each link, said rib being positioned between the ends of the associated links. Formed in the inner face of each link and concentric with the rivet hole therein, is a groove 57, and when a pair of the links are fitted together, the grooves in the inner faces of the overlying portions thereof constitute a circular chamber in which is fitted a ring 58 of bronze or other wear-resisting material. Preferably this ring is forced into the annular groove of one link before the latter is associated with the next adjacent link, and thus a joint is provided which has a relatively large bearing area. These rings are intended to receive the thrust from the flat side of the chain before the adjacent faces of the links themselves meet and as a result there is a material reduction of friction between the links while the chain is in service. Suitable rivets 59 are utilized for pivotally connecting the links of the chain to each other and are preferably provided with shoulders so as to make it practically impossible to jam the links while the smaller ends of the rivets are being upset.

By referring to my copending application hereinbefore mentioned, it will be noted that the plate *b* is provided on its inner end with fingers *x* which project into the spaces between the chains 47, thereby regulating to the desired degree the amount of material fed into the mold cavities, and further, that the rollers *c* operate in the spaces between the chains and directly above the mold cavities to press the briquetting material into said cavities, thereby insuring the proper filling of the latter. By virtue of the position of the rollers *c*, this pressing operation takes place just before the briquetting material is subjected to highest pressure between the drums.

The operation of my improved briquet machine is as follows:

Power shaft 19 is driven and through pinion 18 gear wheel 17 is driven, thereby imparting rotary motion to shaft 13. This rotary motion is transmitted through pinions 15 and 16 and gear wheels 24^a and 25^a to drums 26 and 27 and as the latter is rotated, the chains 47 will travel thereover and will pass from points between the two drums downwardly and thence around tension drum 48. The briquetting material is delivered into box or hopper 30, the open

lower end of which is positioned immediately above the mold cavities in the ring 42 or drum 27 and said material will feed downwardly into the mold cavities between the chains 47, said material being immediately thereafter pressed into said cavities by the rollers *c*. It will be understood, of course, that the mold cavities formed in the rings on the two drums are in direct alignment with each other and as the briquetting material within the said cavities is carried downward, it is compressed until it passes the line of highest pressure which is the horizontal plane occupied by the axes of the two drums, and immediately after passing this point the companion cavities commence to separate or move away from each other. During the time the briquetting material is subjected to pressure between the drums, the flat outer faces of the chains 47 serve as end walls for the mold cavities, with the result that the lateral pressure or pressure lengthwise through the bodies of the briquets is directed immediately against both sides of the chains. In view of the fact that the chains are disposed between the rows of mold cavities, the pressure of the material between the rolls is equal in both directions against the side faces of each chain. Consequently, the stresses due to high compression are neutralized and briquets of uniform density are produced.

It will be noted that the chains after leaving the point of highest pressure move downwardly at an angle or in other words they do not leave the periphery of drum 27 until they have traveled a short distance below the line of highest pressure. This particular action is very desirable for the reason that it entirely eliminates friction between the flat joints of the chain links during the time they leave or pass off the drum 27 and travel downward to tension drum 48. If this arrangement were not carried out, the pressure against the chains from each side while they are leaving the drum would produce an abnormal amount of friction between the flat joints of the chain, which would cause the links to wear rapidly and soon render the chain unfit for service. The inclination of the chains permits them to travel downwardly with the briquets for a short distance before said chains leave the drum and during this time the pressure upon the briquets is being relieved gradually until such time as the links of the chain can open or move relative to each other without thrusts and consequent wear.

It will be understood that the pressure necessary to form the briquets is created through the tendency of the mold drums to move away from each other and such movement is yieldingly resisted by the relatively heavy compression springs 32. The mold drums are carried by the frames or

levers 20 and 21 and the latter are connected for simultaneous and synchronous movement toward and away from each other through the connected pairs of links 36 and the rollers 37 carried thereby, which latter in the event of movement travel vertically between the wear plates 34. By virtue of these equalizing devices, it is impossible for one roll to move to a greater or less degree than the other and any slight movement of one roll or pair of arms carrying the same will be correspondingly transmitted to the other. The feed box 30 is carried by the arms or levers 31 and therefore any swinging movement of the latter will not affect the relative positions of said feed box and drum 27, which latter is carried by said arms or levers 21. The spring pressed roller 48 maintains an equal amount of tension on all of the chains and this tension is desirable and necessary particularly as said chains tend to become heated and expand while in service.

A briquet machine of my improved construction is comparatively simple, can be operated with relatively little power, produces briquets which have uniform density throughout their bodies, and as the operation of the machine is continuous, a comparatively large tonnage of briquets can be produced within a given length of time.

Obviously, minor changes in the size, form and construction of the various parts of my improved briquet machine can be made and substituted for those herein disclosed without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

What I claim is:

1. In a briquet machine, a pair of pressure drums provided in their peripheries with circumferentially disposed rows of mold cavities, and chains carried by one of said drums and disposed between the rows of mold cavities, which chains constitute end walls for the cooperating mold cavities of the two drums at the point of highest pressure between said drums.

2. In a briquet machine, a pair of pressure drums provided in their peripheries with circumferentially disposed rows of mold cavities, chains carried by one of said drums and disposed between the rows of mold cavities, which chains constitute end walls for the cooperating mold cavities of the two drums at the point of highest pressure between said drums, and means for retaining the inner down-running portions of the chains in position upon the drum upon which said chains are mounted for a substantial distance below the point of highest pressure between said drums.

3. In a briquet machine, a pair of pivotally mounted substantially upright frames, cooperating briquet-forming drums journaled in said frames, and a briquet material feeding box carried by the upper portion of one of said frames.

4. In a briquet machine, a pair of drums provided in their peripheries with circumferentially disposed rows of mold cavities, and there being grooves formed between said rows of mold cavities, and chains carried by one of said drums and disposed within the grooves therein, which chains constitute the end walls for the mold cavities.

5. In a briquet machine, a pair of pivotally mounted substantially upright frames, drums journaled in said frames, the peripheries of which drums are provided with mold cavities, means for yieldingly resisting the movement of said frames away from each other, and movement equalizing means arranged between said frames.

6. In a briquet machine, a pair of pivotally mounted substantially upright frames, cooperating mold drums journaled in said frames, means for simultaneously rotating said drums, pivotally connected links connecting said frames, and means for guiding the pivotally connected ends of said links which guiding means is parallel to the common tangent to the rollers at their point of contact.

7. In a briquet machine, a pair of pivotally mounted substantially upright frames, cooperating mold drums journaled in said frames, means for simultaneously rotating said drums, pivotally connected links connecting said frames, rollers carried by said links, and guiding means for said rollers which guiding means is parallel to the common tangent to the rollers at their point of contact.

8. In a briquet machine, a pair of cooperating revoluble drums provided in their peripheries with circumferentially disposed rows of mold cavities, chains arranged to travel over one of the drums and disposed between the mold cavities formed therein, which chains constitute end walls for the cooperating mold cavities of the two drums, and means whereby the inner down-running portions of the chains are held in positions inclined toward the vertical plane occupied by the axis of the drum on which said chains operate and for normally maintaining said chains in taut condition.

In testimony whereof I herewith affix my signature this 26th day of January, 1918.

GUSTAV KOMAREK.

Witness:

LAURA E. SMITH.