G. KOMAREK.

BRIQUET MACHINE.

APPLICATION FILED JUNE 30, 1914.

1,164,822.

Patented Dec. 21, 1915.

5 SHEETS—SHEET 1.

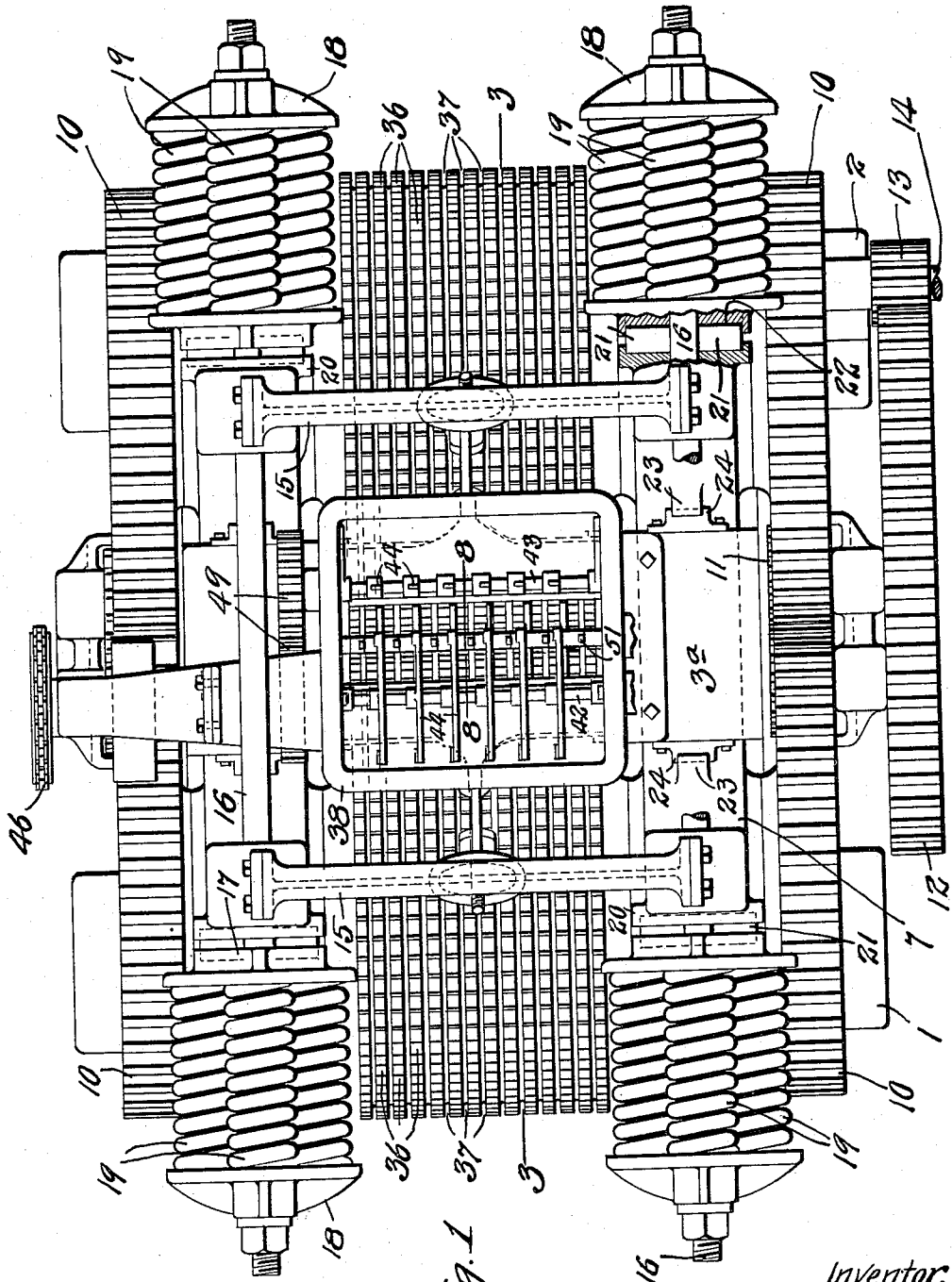


Fig. 1

Witnesses

Wm. Janus

M. O. Smith

Inventor:

Gustav Komarek,

By J. R. Armwell. Atty.

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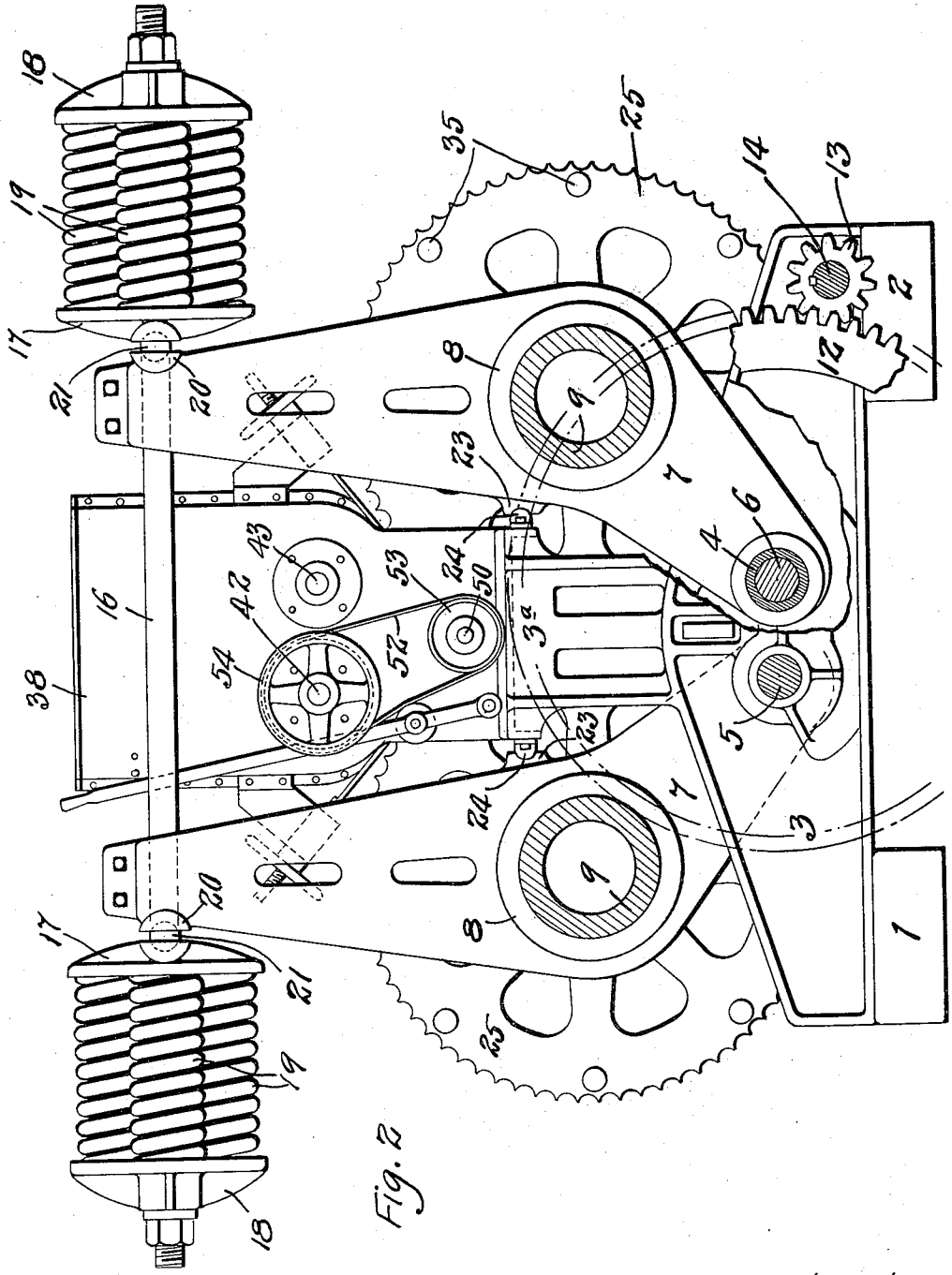


Fig. 2.

Witnesses

Wm. Janus

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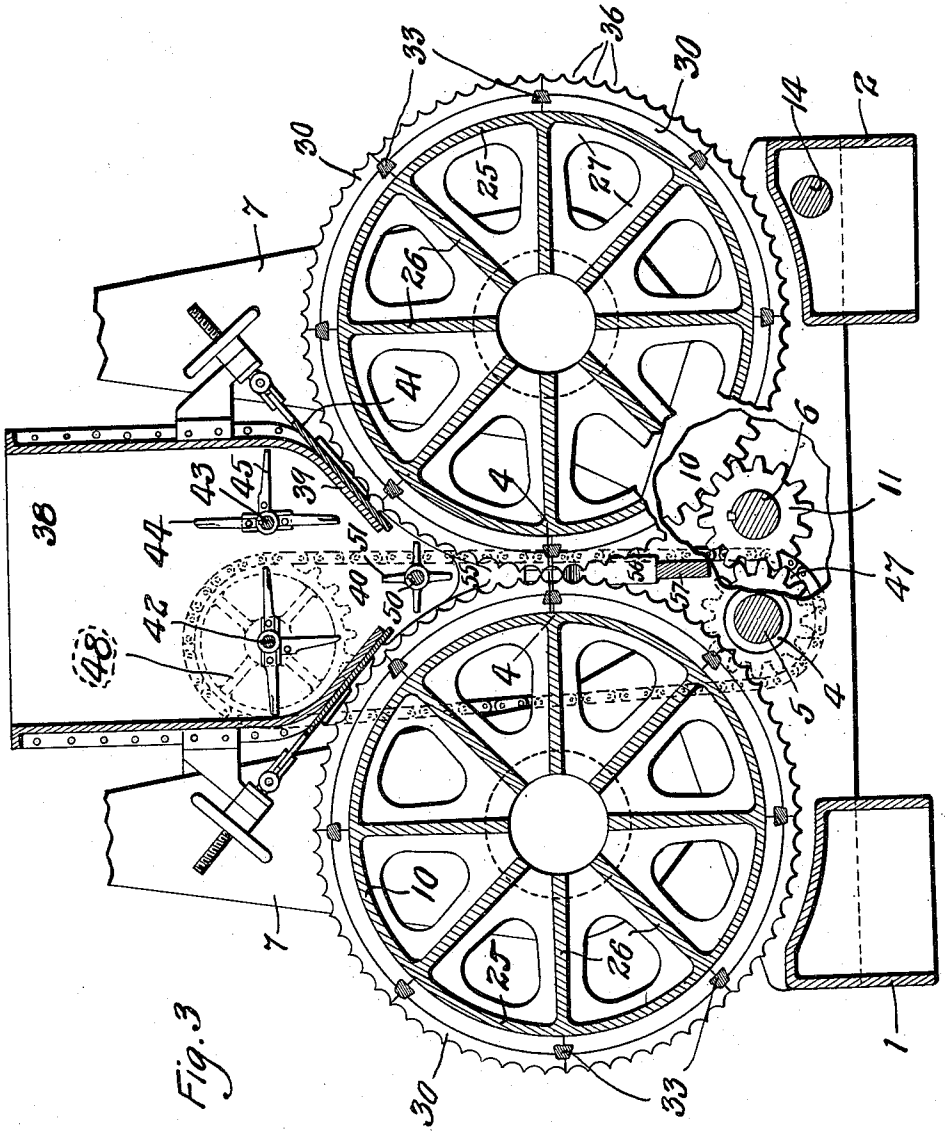


Fig. 3

Witnesses

Wm. Janus

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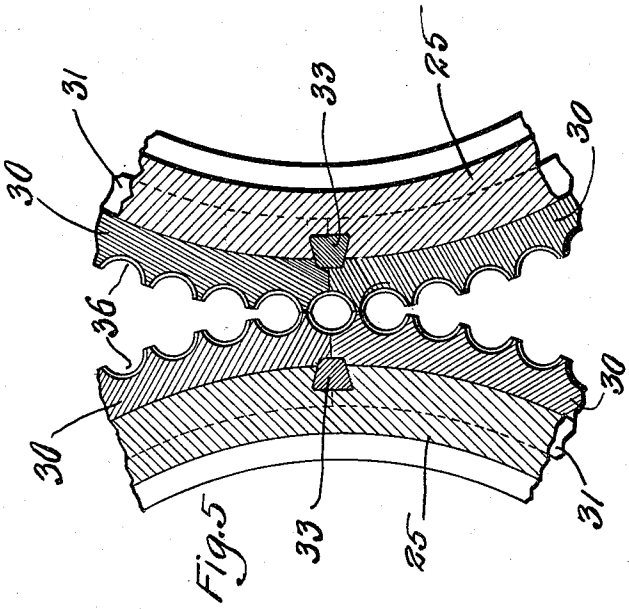


Fig. 5

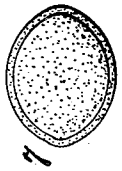


Fig. 7

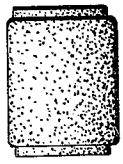


Fig. 6

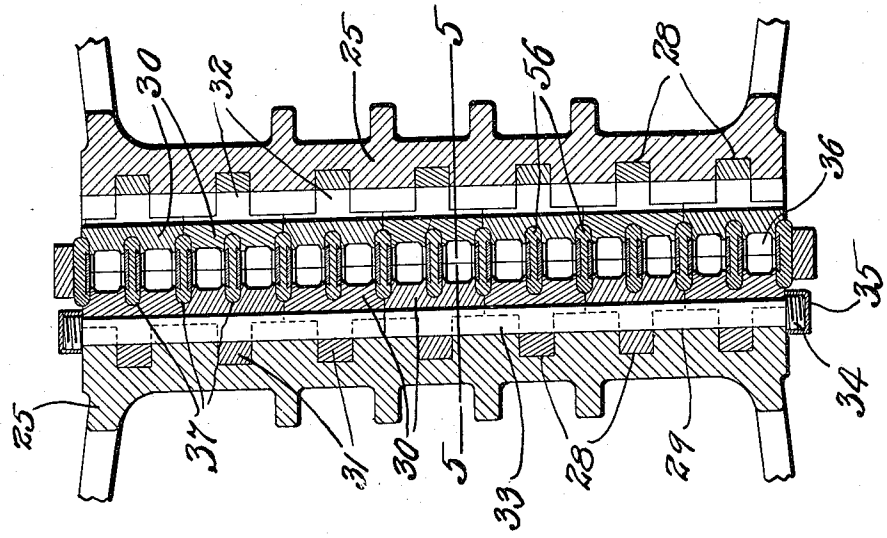


Fig. 4

Witnesses

Wm. Janus

W. D. Smith

Inventor:

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By J. K. Cornwall Atty.

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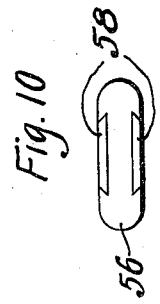
BRIQUET MACHINE.

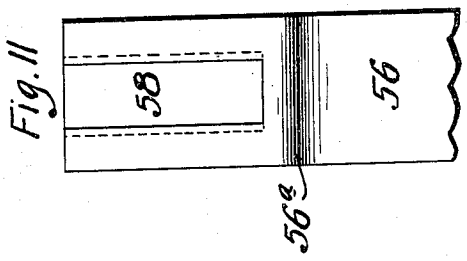
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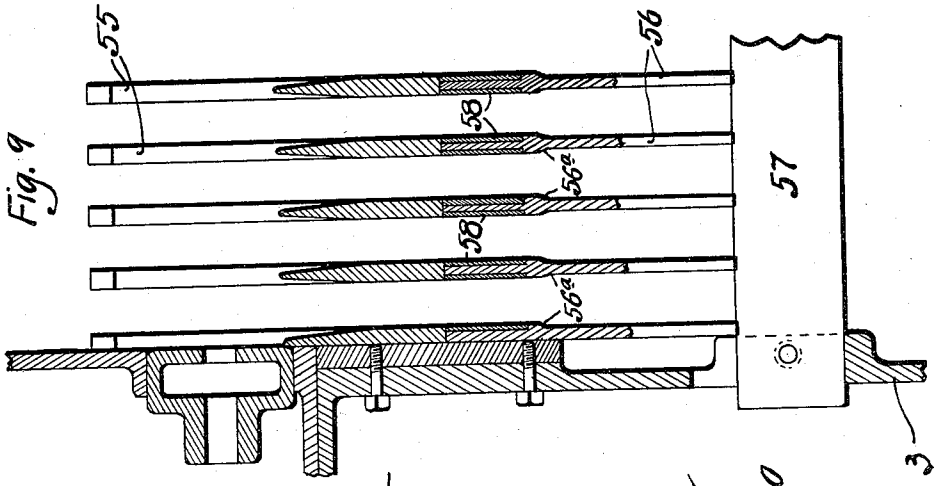
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5 SHEETS—SHEET 5.







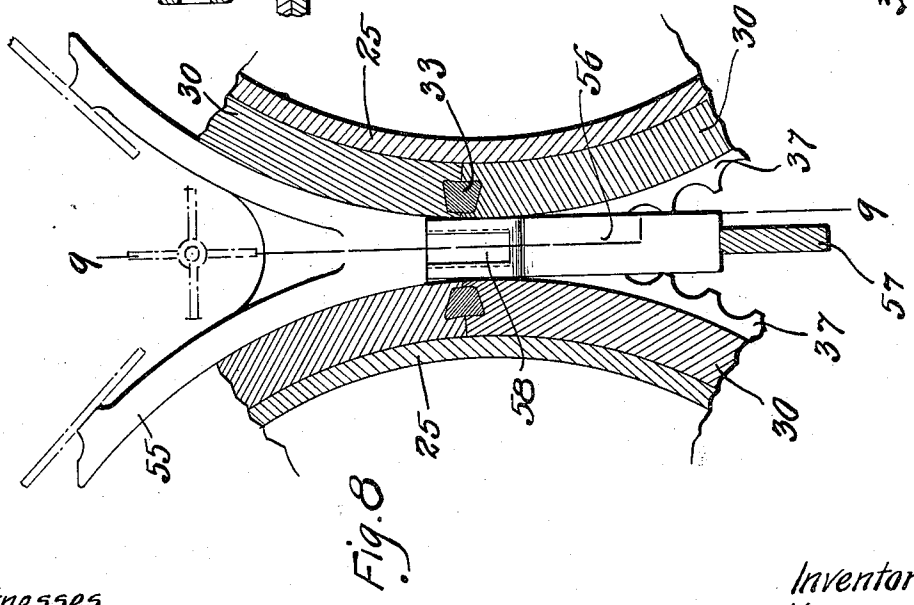


Fig. 8

Witnesses
Wm. James
W. P. Smith

Inventor:
Gustav Komarek,
By F. C. Brownell, Atty.

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GUSTAV KOMAREK, OF ST. LOUIS, MISSOURI, ASSIGNOR TO ST. LOUIS BRIQUETTE MACHINE COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

BRIQUET-MACHINE.

1,164,822. Specification of Letters Patent. Patented Dec. 21, 1915.

Application filed June 30, 1914. Serial No. 848,141.

To all whom it may concern:

Be it known that I, GUSTAV KOMAREK, a citizen of the United States, residing at St. Louis, Missouri, have invented a 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, in which,—

Figure 1 is a plan view of a briquet machine of my improved construction. Fig. 2 is a side elevational view of the machine, with parts broken away and in section, in order to more clearly illustrate the construction of the machine. Fig. 3 is a vertical section taken approximately on line 3—3 of Fig. 1. Fig. 4 is a horizontal section taken approximately on line 4—4 of Fig. 3. Fig. 5 is a detail section taken approximately on line 5—5 of Fig. 4. Figs. 6 and 7 are respectively side and end elevational views of a briquet manufactured with my improved machine. Fig. 8 is an enlarged vertical section taken approximately on line 8—8 of Fig. 1. Fig. 9 is a vertical section taken approximately on line 9—9 of Fig. 8. Fig. 10 is a plan view of a portion of one of the spacing members utilized between the mold cavities in my improved machine. Fig. 11 is an elevational view of the upper end of the spacing member.

My invention relates to that class of machines in which pulverized combustible material in plastic condition is compressed between revolving cylinders or drums to form fuel briquets.

The principal objects of my invention are, to provide a comparatively simple, economically operated machine, which can be operated continuously to produce, within a given length of time, a comparatively large tonnage of briquets; further, to provide means whereby the briquets are subjected to a comparatively high degree of pressure, thereby producing briquets having uniform density; to provide a machine having sectional mold rings, which permits the ready removal of any mold ring section in case the same becomes worn or unfit for service; to provide means whereby the mold carrying drums move uniformly and correspondingly toward and away from each other, thereby maintaining perfect alinement of the mold cavities or pockets; to provide simple and positive means for feeding the plastic material into the mold cavities and to combine with the sectional mold rings stationary spacing members which form walls between the mold cavities, and which spacing members are provided with hardened metal liners or wear plates arranged adjacent to the point of application of greatest pressure to the briquets, which liners or wear plates can be readily removed in case they become worn or broken in service.

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.

As shown in the accompanying drawings, the frame of my improved machine comprises base members 1 and 2, upon which is positioned a pair of hollow side frames 3, the same being preferably cast and provided with centrally arranged upwardly projecting portions 3^a.

Arranged at or near the center of each side frame 3, is a pair of transversely disposed hollow shafts 4, the ends thereof being rigidly seated in the side walls of the side frames, and mounted for rotation within these pairs of hollow shafts are solid shafts 5 and 6, the same extending through and a substantial distance beyond said hollow shafts.

Loosely mounted on the hollow shafts 4 are the lower ends of outwardly and upwardly projecting arms 7 which near their central portions are provided with bearings 8 for the trunnions 9 on the ends of the molding drums of the machine.

Fixed on the outer ends of the trunnions 9 are comparatively large gear wheels 10, and meshing therewith are pairs of meshing pinions 11, the same being rigidly fixed on the outer portions of shafts 5 and 6.

Fixed on one end of shaft 6, is a large gear wheel 12 and meshing therewith is a driving pinion 13, the same being fixed on a driving shaft 14 which latter is journaled in suitable bearings in the side frames 3. By virtue of the construction just de-

scribed, it will be noted that when driving shaft 14 is operated, motion will be transmitted through pinion 13 and gear wheel 12, to shaft 6, and the motion of the latter will be transmitted to shaft 5 through the meshing pairs of pinions 11. Simultaneously, the molding drums of the machine will be uniformly driven toward each other by the engagement of the pinions 11 with the gear wheels 10. Inasmuch as the arms 7 fulcrum upon the shafts 5 and 6, the drums carried by said arms will move uniformly toward and away from each other without in any way affecting or disturbing the relation of the pinions 11 to the drum driving gears 10. The upper ends of the corresponding pairs of arms 7 are rigidly connected by transversely extending bars 15, and thus the pair of arms for each drum will act uniformly.

Extending through the upper ends of the arms 7 at the sides of the machine are heavy rods 16 and arranged thereupon, outside the upper ends of the arms, are inner and outer plates 17 and 18 which serve as supports for nests of comparatively heavy compression springs 19. Formed on the outer faces of the upper portion of the arms 7 and in horizontal alinement with the rods 16 are bearings 20 in which are located rollers 21, the same having bearings 22 on the corresponding faces of the inner plates 17. These rollers 21 serve to form a yielding joint which is effective when there is an appreciable amount of movement between the upper ends of the arms and the nests of springs.

Formed on the inner faces of the arms 7 and at points near the bearings 8 thereof are stop lugs 23 which are adapted to engage brackets or lugs 24 on the extensions 3ª of the frames 3, thus limiting the movement of the arms 7 toward each other, which limiting movement prevents the faces of the mold rings carried by the drums from bearing against and grinding upon each other during operation.

The drums of my improved machine comprise cylindrical bodies 25 which are preferably formed integral with the trunnions 9 and extending inwardly from said cylindrical body portions are radially disposed webs 26. The ends of the body portions 25 and the radial webs are connected to the trunnions by means of end walls or webs 27.

Formed in the periphery of each drum is a series of circumferentially disposed grooves 28, the same being spaced at equal distances apart and intersecting these grooves are transversely disposed grooves 29 which are under-cut or dove-tailed in cross section.

The mold rings carried by the drums are made in arcuate sections 30 of hardened metal which are formed so as to fit snugly against the peripheries of the drums, and formed integral with and projecting rearwardly from these sections are ribs 31 which fit snugly within the circumferential grooves 28. These ribs 31 are substantially narrower than the ring sections, and therefore the main body portions of said sections have a substantial bearing on the periphery of the drum at both sides of the grooves therein.

Formed through the ribs 31 are transversely alined openings 32 which are of the same shape and are adapted to coincide with the transversely disposed grooves 29, and positioned in these grooves 29 and openings 32 are retaining bars 33, which serve to rigidly maintain the mold ring sections in proper position on the drums. These retaining bars are preferably made in sections in order that they can be inserted from both sides of the drums, and the outer ends of the sections forming each retaining bar are preferably threaded as designated by 34 in order to be engaged by a suitable tool when it becomes necessary to withdraw said bar for the purpose of replacing a worn or broken mold ring section. These threaded ends 34 are normally closed by caps 35 which prevent the threads from becoming battered during the operation of the machine.

The outer face of each mold ring section is provided with one or more rows of mold cavities 36, which may be termed complementary cavities in that the cavities on each ring coöperate with the cavities on the oppositely disposed ring in complementary fashion to form substantially cylindrical pockets in which the briquets are formed and compressed.

Formed in the peripheries of the mold rings between the mold cavities therein are circumferentially disposed grooves 37 which receive stationary spacing members, the same being arranged between the two drums, as hereinafter more fully described.

Fixed on top of the upper extensions 3ª of the side frames is a hopper 38 in which is placed the plastic material of which the briquets are formed. The lower ends of the end walls of this hopper are bent inwardly as designated by 39 to form a throat or discharge opening 40 which is immediately above the meeting line of the mold rings carried by the drums. Positioned beneath these inwardly bent end walls are sliding plates 41 which are adjustable and serve the purpose of gates which may be readily shifted to regulate the feed of the plastic material into the mold cavities.

Transversely positioned in the lower portion of the hopper 38 and journaled in the side walls thereof is a pair of shafts 42 and 43, and fixed thereon within the hopper are stirring arms 44. Mounted on these shafts immediately adjacent to the side walls of the hopper are blades 45. As the shafts

42 and 43 are operated, the arms 44 stir and agitate the material in the lower portion of the hopper and the blades 45 act as scrapers to remove the plastic material from the end walls of the hopper. Shaft 42 is operated by means of a sprocket chain 46 which operates upon a sprocket wheel 47 on the outer end of shaft 5, and upon a sprocket wheel 48 which is fixed on the shaft 42. Rotary motion is transmitted from shaft 42 to shaft 43 by means of meshing pinions 49 which are mounted upon said shafts outside the hopper.

Arranged in the extreme lower end of the hopper and below the mouth 40 thereof is a transversely disposed shaft 50 which carries a series of short stirring arms 51, and as said shaft 50 is rotated, these arms stir the mass of plastic material and evenly distribute the same into the mold cavities immediately beneath. This shaft is driven by means of a belt 52, which operates upon a pulley 53 which is fixed on the outer end of shaft 50 and upon a pulley 54 which is fixed upon the corresponding end of shaft 42.

The stationary spacing members which provide end walls for the mold cavities are each formed in two main parts, an upper Y-shaped member 55, the arms of which fit snugly in an oppositely disposed pair of the grooves 37 immediately beneath the sliding plates 41. The lower end of this upper member terminates at a point slightly above a horizontal plane occupied by the centers of the main drums of the machine, and positioned immediately below each upper member is a straight vertically disposed lower member 56, the edges of the upper portion of which occupy a corresponding pair of the grooves 37. The lower ends of all of the lower members 56 rest upon a transversely disposed bar 57, the ends of which are removably positioned in the inner walls of the side frames 3. The upper portions of the side faces of these lower members 56 serve as end walls for the mold cavities formed by the mating recesses 36, and removably positioned in the upper portions of the side faces are hardened metal liners or wear plates 58. The portions of the lower spacing members 56 immediately below the portions which carry the liners or wear plates are slightly reduced in thickness as designated by 56^a, thus permitting the compressed briquets to readily discharge from the mold cavities after the same have been subjected to high pressure during which latter action the ends of the briquets within the cavities are bearing against the hardened metal liners or wear plates. The spaces between the lower ends of the upper members 55 and immediately below the shaft 50 and its stirring arms, form a series of secondary hoppers, one for each corresponding series of mold cavities, and the plastic material is thus practically confined during its passage into the annular rows of mold cavities, and consequently an equal distribution of said material is insured. The webs between the lower portions of the Y-shaped members 55 prevent the material from moving laterally during its downward feeding movement into the mating pairs of cavities.

By my improved arrangement of spacing members and mold rings, each ring with its adjacent spacers forms a complete and independent unit, and as the force of compression acts against both sides of the stationary spacing members with the same force, the effect is neutralized throughout all of said spacers, with the exception of the two outside members, which latter bear against suitable thrust blocks positioned against the inner face of the side frames 3.

Immediately after the high compression has been imparted to the briquets, the mold cavities commence to separate, and at this time they bear downward on the compressed briquets as the latter reach the narrowed portions of the lower members 56, at which point said briquets are free to drop by force of gravity.

The advantage gained by making the spacing members in two parts is, that the lower parts carrying the liners or wear plates can readily be removed for the purpose of inserting new liners or wear plates without disturbing the upper portions of the spacing members.

In the operation of my improved machine, the main driving shaft 14 is operated, and through the driving connections as hereinbefore described, the two drums carrying the mold rings are driven toward each other at the same speed. Simultaneously the shafts 42, 43 and 50 carrying the stirring and feeding arms are rotated and the plastic material in the lower portion of the hopper is continuously agitated and caused to discharge downward through the mouth 40 from whence said material is uniformly delivered into the chambers between the upper portions 55 of the stationary spacing members. The plastic material fills the mating mold cavities 46 and as said mating cavities pass the horizontal center of the drums, said material within said cavities is highly compressed into briquet form. The stationary spacers close the ends of the mold cavities, and while under compression, the ends of the briquets rub against the liners or wear plates 58, which latter prevent the escape of the compressed material from the ends of the mold cavities. Such construction causes the material within the cavities to be compressed at the sides as well as on the circumferential surface, and as a result, the briquets have uniform density. The stationary spacers between the mold rings are in-

strumental in effecting a proper discharge of the molded briquets, for it will be understood that after passing the horizontal center line of the drums, the mold cavities commence to separate or move apart simultaneous with their downward movement, but during such movement, the ends of the briquets frictionally engage the lower portion of the liners or wear plates 58, and by adhesion they are maintained in proper position until they reach the narrowed portions 56ª of the lower members 56. Thus the compressed briquets will be carried straight downward instead of following a curved path of travel, such as is taken by the downwardly moving mold cavities.

It will be understood that under normal working conditions, the arms 7 are positioned with the stop lugs 23 bearing against the lugs or brackets 24, said arms being so held by the nests of springs on the ends of rods 16. These springs yieldingly resist any outward movement of the upper ends of the arms 7, and in case said arms do swing apart when predetermined pressure is exceeded, then said arms will swing about the shafts 6, as axes, during which time the relation between the pinions 11 and gear wheels 10 is in no wise affected. Likewise the proper relation or alinement of the pairs of mold cavities is in no wise affected, for it will be understood that the outward swinging movement of the arms 7 will in all instances be uniform.

By my improved construction, the drum carrying arms act correspondingly and synchronously, and regardless of their movement, the alinement of the working or yielding parts will not be affected.

Another material advantage of my improved construction is that the mold rings can readily be repaired when a section becomes worn or broken, and the drums carrying the mold rings can be easily brought together to compensate for the decreased outside diameter of the repaired mold rings without disturbing any other member. During operation, the outer faces of the mold rings on one drum barely engage the corresponding rings on the opposite drum without pressure, thus obviating any tendency of the faces of the rings to wear during operation.

A briquet machine of my improved construction is comparatively simple, can be operated with comparatively little power, produces solid briquets having uniform density, and is particularly adapted for producing, within a given length of time, a comparatively large tonnage of briquets.

It will be readily understood that minor changes in the size, form and construction of the various parts of my improved machine can be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim:

1. In a machine of the class described, a frame, a pair of shafts journaled therein, sleeves loosely mounted on said shafts, a pair of arms having their lower ends loosely mounted on each sleeve, the upper ends of the arms of each pair being rigidly connected, a molding drum journaled in each pair of arms, gear wheels carried by said drums, and meshing pinions fixed on the pair of shafts, which pinions engage with the gear wheels carried by said drums.

2. In a machine of the class described, a frame, a pair of shafts journaled therein, sleeves loosely mounted on said shafts, a pair of arms having their lower ends loosely mounted on each sleeve, the upper ends of the arms of each pair being rigidly connected, a molding drum journaled in each pair of arms, gear wheels carried by said drums, meshing pinions fixed on the pair of shafts, which pinions engage with the gear wheels carried by said drums, and yielding pressure means coöperating with said pairs of arms to resist spreading movement.

3. In a machine of the class described, a frame, a pair of shafts journaled therein, sleeves loosely mounted on said shafts, a pair of arms having their lower ends loosely mounted on each sleeve, the upper ends of the arms of each pair being rigidly connected, a molding drum journaled in each pair of arms, gear wheels carried by said drums, meshing pinions fixed on the pair of shafts, which pinions engage with the gear wheels carried by said drums, yielding pressure means coöperating with said pairs of arms to resist spreading movement, and stops on the frame for limiting the movement of the arms toward each other.

4. In a briquet machine, a frame, a pair of shafts journaled therein, sleeves loosely mounted on said shafts, a pair of substantially inverted U-shaped frames, the lower ends of the legs of which are loosely mounted on said sleeves, molding drums having trunnions at each end, which are journaled in the legs of the inverted U-shaped frames, gear wheels fixed on said trunnions, and pairs of meshing pinions fixed on the pair of shafts and meshing respectively with said gear wheels.

5. In a briquet machine, a frame, a pair of shafts journaled therein, sleeves loosely mounted on said shafts, a pair of substantially inverted U-shaped frames, the lower ends of the legs of which are loosely mounted on said sleeves, molding drums having trunnions at each end, which are journaled in the legs of the inverted U-shaped frames, gear wheels fixed on said trunnions, pairs of

meshing pinions fixed on the pair of shafts and meshing respectively with said gear wheels, and yielding pressure means cooperating with the upper portions of said inverted U-shaped frames to resist their spreading movement.

6. In a briquet machine, a frame, a pair of shafts journaled therein, sleeves loosely mounted on said shafts, a pair of substantially inverted U-shaped frames, the lower ends of the legs of which are loosely mounted on said sleeves, molding drums having trunnions at each end which are journaled in the legs of the inverted U-shaped frames, gear wheels fixed on the pair of shafts and meshing respectively with said gear wheels, yielding pressure means coöperating with the upper portions of said inverted U-shaped frames to resist their spreading movement, and stops on the frame for limiting the movement of the inverted U-shaped frames toward each other.

7. In a briquet machine, a frame, a pair of shafts journaled therein, sleeves loosely mounted on said shafts, a pair of substantially inverted U-shaped frames, the lower ends of the legs of which are loosely mounted on said sleeves, molding drums having trunnions at each end which are journaled in the legs of the inverted U-shaped frames, gear wheels fixed on the pair of shafts and meshing respectively with said gear wheels, yielding pressure means coöperating with the upper portions of said inverted U-shaped frames to resist their spreading movement, stops on the frame for limiting the movement of the inverted U-shaped frames toward each other, and a feed hopper carried by the frame above said molding drums.

8. In a briquet machine, a pair of rotatably mounted molding drums provided in their faces with rows of complementary mold cavities and with circumferentially disposed grooves between said rows of mold cavities, a feed hopper arranged above said drums, and a series of Y-shaped spacing members positioned between the mouth of said hopper and said molding drums, the lower portions of which spacing members occupy the grooves in said drums.

9. In a briquet machine, a pair of rotatably mounted molding drums provided in their faces with rows of complementary mold cavities and with circumferentially disposed grooves between said rows of mold cavities, a feed hopper arranged above said drums, and a series of Y-shaped spacing members positioned between the mouth of said hopper and said molding drums, the lower portions of which spacing members are separate from the upper portions, and said separate lower portions being provided in their side faces with detachable wear resisting plates.

10. In a machine of the class described, a pair of drums mounted for movement toward and away from each other, yielding pressure means for resisting the movement of said drums away from each other, means whereby said drums are uniformly and correspondingly rotated, a series of sectional mold rings removably positioned on each of said drums, and provided with mold cavities, and a series of stationary spacing members positioned between the mold rings in position to act as end walls for the cavities therein.

11. In a machine of the class described, a pair of coöperating revoluble drums, rings positioned on the peripheries of said drums, which rings are provided with mold cavities and with circumferentially disposed grooves between said cavities, and stationary spacing members positioned between said drums and in the circumferential grooves in the mold rings which spacing members form end walls for the mold cavities.

12. In a machine of the class described, a pair of drums, rings positioned on the peripheries of said drums, which rings are provided with mold cavities and with circumferentially disposed grooves between said cavities, stationary spacing members positioned between said drums and in the circumferential grooves in the mold rings, and removable wear plates carried by the side faces of said spacing members which latter serve as end walls for the mold cavities.

13. In a machine of the class described, a pair of drums, rings positioned on the peripheries of said drums, there being mold cavities formed in the faces of said rings, and spacing members arranged between the drums and the rings thereon to form end walls for the mold cavities in said rings.

14. In a machine of the class described, the combination with a pair of drums having mold cavities in their peripheries and with circumferential grooves between said mold cavities, of stationary spacing members arranged between said drums and fitting into the circumferential grooves.

15. In a machine of the class described, the combination with a pair of drums having mold cavities in their peripheries and with circumferential grooves between said mold cavities, of stationary spacing members arranged between said drums and fitting into the circumferential grooves, and wear plates carried by said spacing members in alinement with the horizontal center of the drums.

16. In a machine of the class described, the combination with a pair of drums having mold cavities in their peripheries and with circumferential grooves between said mold cavities, of stationary spacing members arranged between said drums and fitting in the circumferential grooves, and a

support below the axes of the drums for said stationary spacing members.

17. In a machine of the class described, the combination with a pair of drums having mold cavities in their peripheries and with circumferential grooves between said mold cavities, of stationary spacing members arranged between said drums and fitting into the circumferential grooves, wear plates carried by said spacing members in alinement with the horizontal centers of the drums, and the lower ends of which spacing members below the wear plates are narrower than the upper portions.

18. In a machine of the class described, a pair of drums mounted for rotation, sectional mold rings detachably positioned on the peripheries of said drums, which mold rings are provided in their outer faces with mold cavities and circumferentially disposed grooves, the latter being arranged between the mold cavities, and substantially Y-shaped spacing members positioned between said drums and occupying the circumferentially disposed grooves in the mold rings.

19. In a machine of the class described, a pair of drums mounted for rotation, sectional mold rings detachably positioned on the peripheries of said drums, which mold rings are provided in their outer faces with mold cavities and circumferentially disposed grooves, the latter being arranged between the mold cavities, substantially Y-shaped spacing members positioned between said drums and occupying the circumferentially disposed grooves in the mold rings, and removable wear plates carried by said spacing members, which wear plates constitute end walls for the mold cavities while the latter are in immediate coincidence with each other.

20. In a machine of the class described, a pair of rotatably mounted drums, mold rings arranged on the peripheries of said drums, which mold rings are provided in their outer faces with mold cavities, a hopper arranged above the drums, and a series of stationary spacing members positioned between the drums and below the hopper for guiding the plastic material into the mold cavities.

21. In a machine of the class described, a pair of rotatably mounted drums having complementary mold cavities formed in their peripheries and with circumferentially disposed grooves between said mold cavities, a series of Y-shaped spacing members arranged between said drums, the lower portions of which members are separate from the upper portions, and a transversely disposed fixed member forming a support for the separate lower portions of said spacing members.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this 12th day of June, 1914.

GUSTAV KOMAREK.

Witnesses:
M. P. SMITH,
M. A. HANDEL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."