

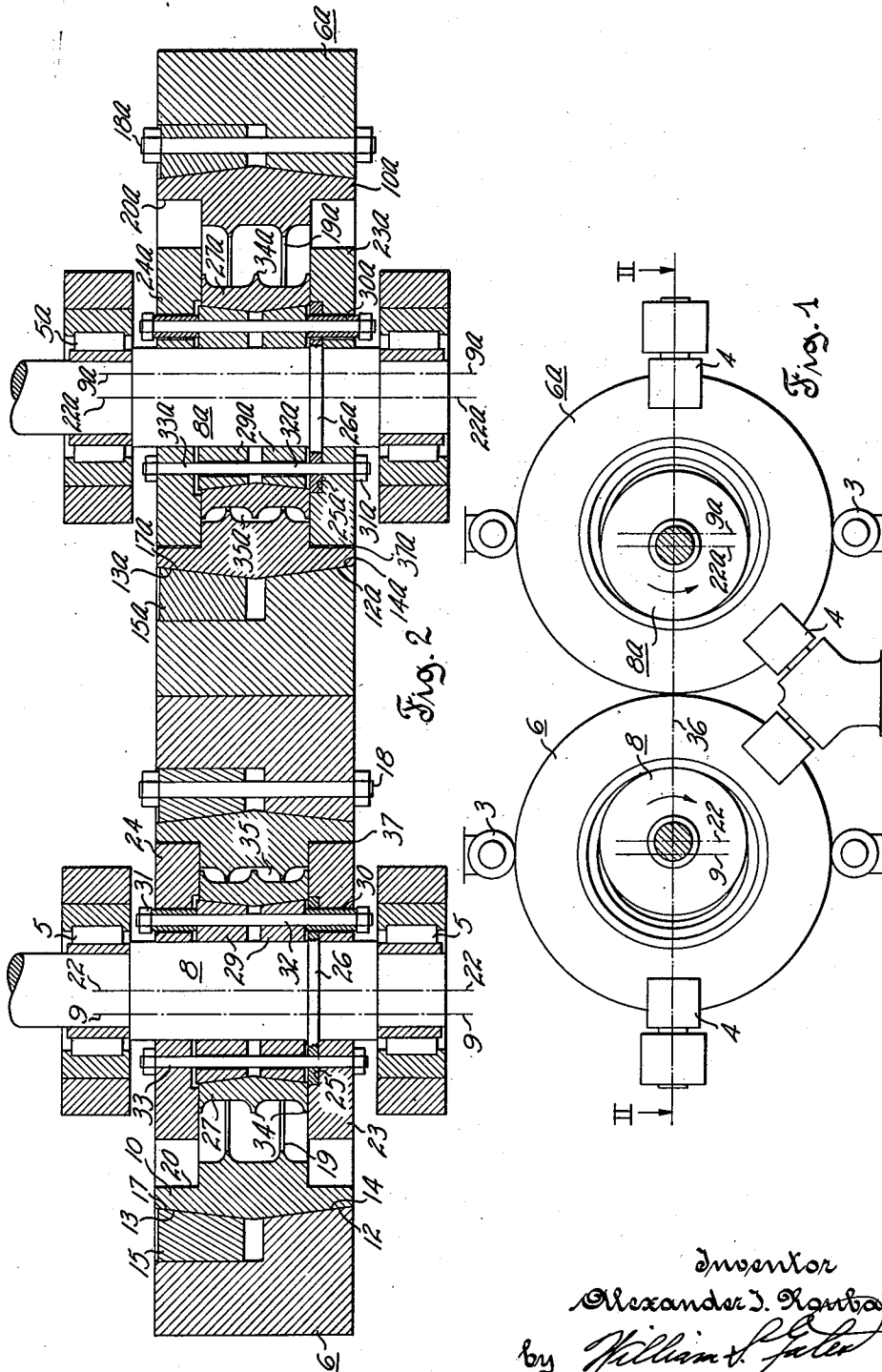
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A. J. ROUBAL

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ECENTRIC DUPLEX BRIQUETTING PRESS

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Inventor
Alexander J. Roubal
by William T. Faler
Attorneys

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ECCENTRIC DUPLEX BRIQUETTING PRESS

Alexander J. Roubal, Milwaukee, Wis., assignor to
Allis-Chalmers Manufacturing Company, Milwaukee, Wis.

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This invention relates to duplex briquetting machines, and more particularly to briquetting machines having eccentric coaction. A principal object of the invention is the provision of new and improved machines of these types.

The introduction of duplex briquetting machines into the art has presented new problems heretofore not encountered in the commercial use of single eccentric briquetting machines. In general, duplex machines of this type are constructed and arranged to obviate the necessity of a conventional backing roll, by the substitution therefor of another similar briquetting unit, hence forming a single machine wherein each unit is adapted to function as a backing roll for the other as well as a briquetting unit. This adaption utilizes pressures developed in the material fed to each unit for accomplishing the requisite transmission of substantially equal and opposite forces from one unit to the other. An interruption of material flow to one of the units would disturb this relationship, therefore tending to effect contact of the briquetting dies which would result in considerable damage thereto or to other working parts of the machine. Hence it is a further object of this invention to obviate this undesirable result.

Another object of the invention is to provide a simple means for limiting the eccentric relationship of each of the briquetting units.

More in particular the present invention relates to the provision of means engageable under abnormal conditions to limit die clearance in a duplex press.

Other objects will appear hereinafter as the description of the invention proceeds.

The novel features of the invention and how the objects are attained will appear from this specification and accompanying drawing showing one embodiment of the invention and forming a part of this application, and all of these novel features are intended to be pointed out in the claims.

In the drawing:

Fig. 1 is a diagrammatic front elevational view of an eccentric duplex briquetting machine; and

Fig. 2 is a horizontal sectional view taken along line II—II of Fig. 1.

With reference to Fig. 1, the duplex briquetting machine comprises hollow first means, herein shown as a pair of hollow cylinders 6, 6a positioned between and rotatably supported by anti-friction rollers 3, and axially positioned by side rollers 4; and rotatable second means, such as cylinders 8, 8a located within the first means, and

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journalled for rotation in bearings 5, 5a carried by a suitable frame, not shown. The cylinders 8, 8a are driven by any well known means in the art, not shown, in opposite directions with respect to each other.

Referring more particularly to Fig. 2, the pair of hollow cylinders 6, 6a are externally engaged with each other in rolling contact, and are rotatable about parallel axes 9—9, 9a—9a, respectively. In comparison with the single eccentric briquetting machines such as that shown in F. W. Hasing, U. S. Patent No. 1,931,759, in which the roller support takes the briquetting pressure; in the duplex press one of the hollow cylinders, for example 6, acts as a backing roll for the other hollow cylinder 6a. Hence hollow cylinders 6, 6a are engaged at all times during operation. Due to the nature of the roller support in the duplex press of this present invention, axes 9—9, 9a—9a are laterally displaceable and any displacement of one of the hollow cylinders toward the other must be accompanied by a similar displacement of the other hollow cylinder in the same direction, as will more clearly be understood from the description of the operation of my invention hereinafter.

The following structural description is restricted to the eccentric briquetting unit encompassed within the hollow cylinder 6, but is equally applicable to duplicate elements identified by the same reference characters with the suffix a, co-acting with hollow cylinder 6a.

An outer circular die 10, carried on the internal periphery of the hollow cylinder 6, is provided with an external periphery resembling two intersecting frusto-conical surfaces 12, 13. Surface 12 abuts a complementary frusto-conical surface 14, of the hollow cylinder 6, and the surface 13 of the circular die abuts a similar surface 17 of a wedge ring 15 which is forceably squeezed between the circular die 10 and the hollow cylinder 6 by bolts 18, for rigidly securing the circular die to the hollow cylinder.

The internal portions of the outer die 10 comprise an annular briquetting area extending to both sides of ridges 19, and cylindrical surfaces 20 of greater diameter than the briquetting area, and located on each side thereof. The surface 20 performs no briquetting function and is only associated therewith as will hereinafter more clearly appear.

The rotatable cylinder 8 is rotatable about an adjustable axis 22—22, which for the purpose of the present description of the invention may be considered as fixed. The axis 22—22 is herein

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shown as parallel to and eccentrically spaced with respect to the axis 9—9 of the hollow cylinder 6—6. Hence a pressure creating zone is formed between the hollow cylinder 6 and the rotatable cylinder 8, due to the eccentric relationship of their respective axes 9—9, 22—22.

Means, such as annular flanges 23, 24, are disposed between the first and second means, and as here shown carried by one of the means, for example the rotatable cylinder 8. The flange 23 is provided with an annular depression 25 for the reception of a flange 26, which may be integral with the rotatable cylinder 8, for the positive axial positioning of the flange 23. Annular flange 24 is axially spaced from flange 23, by an inner die 27 which is secured to the rotatable cylinder 8 by circular wedges 29 forced between the rotatable cylinder 8 and the inner die 27. The circular wedges 29 are pressed toward each other against the radial resistance of the inner die 27, by sleeves 30, which pass through the annular flanges 23, 24 and flange 26, by drawn up nuts 31 threaded to bolts 32. The annular flanges 23, 24 are rigidly secured to the rotatable cylinder 8 by bolts 33 passed through circular wedges 29.

The external periphery of the inner die 27 forms a briquetting area defined by axially spaced ridges 34 cooperative with ridges 19 on the outer circular die 10.

As previously stated, the eccentric relationship between the hollow cylinder 6 and the rotatable cylinder 8 forms a pressure creating zone hereinafter designated by the reference character 35. Material is fed to this zone 35 by any well known means, not shown, preferably from both sides of the unit simultaneously. Reference character 37 indicates clearance between the periphery of the flanges 23, 24 and the surface 20 which forms a track surface for the flanges. For simplicity and clarity purposes, the clearance 37 is shown only in Fig. 2, and also in order to show a smaller magnitude of clearance between the track surface 20 and the flanges 23, 24 in comparison to the clearance between the portions of the dies 10, 27. Hence it is evident that a displacement of the outer die 10 would effect engagement of the track surface 20 with the flanges 23, 24 to therefore prevent contact of the ridges 19, 34 with the inner die 27 and outer die 10, respectively.

From Fig. 1 it is observed that the axes 22—22 and 22a—22a are offset from the respective axes 9—9 and 9a—9a, and lie between them in a common plane 36. The zones 35 and 35a are opposed to each other, and intersect plane 36 between the hollow cylinders 6—6a and rotatable cylinders 8—8a, respectively.

Prior to operation, the eccentricities between the fixed axes 22—22 and 22a—22a and the displaceable axes 9—9 and 9a—9a, respectively, are adjusted to create a predetermined clearance between the outer dies 10—10a and the inner dies 27—27a, respectively, in accordance with the amount of material to be fed therebetween, and the requisite pressure necessary to form briquettes of the desired quality. In operation it is desirable that the material be fed to the zones 35, 35a at a steady uniform rate, and under this condition of operation the eccentricities of the fixed axes 22—22, 22a—22a with respective displaceable axes 9—9, 9a—9a remain substantially equal. However, should there be an interruption of material flow to one of the eccentric briquetting units, for example the stoppage or substantial decrease of flow of material to the zone 35, the pressures created within the zone 35a would tend

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to force hollow cylinder 6a toward hollow cylinder 6, and hollow cylinders 6 toward rotatable cylinder 8, hence decreasing the clearance defining zone 35. If it were not for the flanges 23, 24 the ridges 19, 34 would then contact the respective inner die 27 and the outer die 10 resulting in considerable damage thereto. The flanges 23, 24, however, are arranged to limit the minimum clearance in zone 35, and are engageable in rolling contact with the track surface 20 of the hollow cylinder 6 under this abnormal operating condition. Conversely the flanges 23a, 24a are engageable in rolling contact with surface 20a of the hollow cylinder 6a if there is a pressure in the zone 35 which exceeds the pressure in zone 35a. Under this abnormal operating condition, hollow cylinder 6 will force hollow cylinder 6a toward rotatable cylinder 8a. Obviously the flanges 23a, 24a will then engage track surfaces 20a to prevent the contact of the ridges 19a, 34a with portions of the opposed dies by limiting the displacement of the outer die 10a from its normal eccentricity with respect to the inner die 27a, and hence compensate for difference in pressure in zones 35 and 35a.

From the foregoing it will be apparent to those skilled in the art that the illustrated embodiment of the invention includes a new improvement in duplex briquetting machines, and accomplishes the objects of the invention. It will also be obvious to those skilled in the art that the illustrated embodiment of the invention may be variously changed and modified, or the features thereof, singly or collectively, embodied in other combinations than that illustrated, without departing from the spirit of the invention, or sacrificing all of the advantages thereof, and that accordingly the particular embodiment illustrated and described herein is by way of example only, and the invention is not limited thereto, but is intended to include everything within the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. A duplex briquetting machine comprising a pair of hollow cylinder means mounted for rotation on parallel spaced axes and in external engagement; a pair of cylinder means within said hollow cylinder means rotatable about parallel spaced axes lying between the spaced axes of said hollow cylinder means; cooperating die means on said hollow cylinder means and said cylinder means; and engageable means disposed between said hollow cylinder means and said cylinder means to limit clearance between said die means under abnormal operating conditions.

2. A duplex briquetting machine comprising a pair of hollow cylinders supported for rotation about laterally displaceable parallel spaced axes, in external peripheral engagement; a rotatable cylinder within each of said hollow cylinders, said rotatable cylinders being mounted for rotation about spaced parallel axes lying in a plane common to and between the axes of said hollow cylinders; cooperating die means on said hollow cylinders and said rotatable cylinders; and means on said hollow cylinders and said rotatable cylinders engageable in rolling contact to limit clearance between said die means under abnormal operating conditions.

3. A duplex briquetting machine comprising a pair of hollow cylinders supported for rotation about laterally displaceable parallel spaced axes, in external peripheral engagement; a rotatable cylinder within each of said hollow cylinders

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and eccentric thereto; cooperating die means carried by each of said hollow and rotatable cylinders defining opposed zones intersecting a plane common to said axes of said hollow cylinders and lying between respective hollow and rotatable cylinders; and minimum zone clearance establishing means on said hollow and rotatable cylinders for preventing contact of said dies under abnormal operating conditions.

4. A duplex briquetting machine comprising a pair of hollow cylinders supported for rotation about laterally displaceable parallel spaced axes, in external engagement; a rotatable cylinder within each of said hollow cylinders mounted for rotation about an axis eccentrically spaced from and parallel to said axes of said hollow cylinders, the axes of said rotatable cylinders lying in a plane common to and between said axes of said hollow cylinders; cooperating die means carried by said hollow and rotatable cylinders; and means on said hollow and rotatable cylinders for limiting the eccentric spacing of said eccentrically spaced axes to prevent damage to said die means under abnormal operating conditions.

5. A duplex briquetting machine comprising a pair of hollow cylinders mounted for external peripheral engagement and rotation in opposite directions about parallel spaced axes; a rotatable cylinder within each of said hollow cylinders and rotatable about an axis spaced from and parallel to and lying between said axes of said hollow cylinders in a plane common thereto; an outer die carried by each of said hollow cylinders; inner dies cooperative with said outer dies and carried by said rotatable cylinders; an internal annular track surface on each said hollow cylinder; and flanges carried on said rotatable cylinders and engageable in rolling contact with said track surfaces under abnormal operating conditions for preventing engagement of said inner and outer dies.

6. A duplex briquetting machine comprising a pair of hollow cylinders supported for rotation

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in opposite directions about laterally displaceable parallel spaced axes, in rolling engagement; a rotatable cylinder within each of said hollow cylinders mounted for rotation about an axis within a common plane, and parallel to and between said axes of said hollow cylinders; an outer die secured to the inner periphery of each of said hollow cylinders, and an inner die secured to the external periphery of each of said rotatable cylinders, said inner and outer dies being provided with cooperative ridges defining briquetting areas; and annular flanges secured to said rotatable cylinders in engageable rolling contact with one of said outer dies for preventing lateral displacement of said outer dies to effect contact of said ridges of one pair of said inner and outer dies.

7. A duplex briquetting machine comprising a pair of hollow cylinders supported for rotation in opposite directions about laterally displaceable parallel spaced axes, in rolling engagement; an outer die secured to the inner periphery of each of said hollow cylinders, an annular briquetting area on an internal portion of each said outer die, a cylindrical track surface located on each side of each said briquetting area; a rotatable cylinder within each of said hollow cylinders, mounted for rotation about an axis parallel to and lying between said axes of said hollow cylinders in a plane common thereto; an inner die radially secured to each of said rotatable cylinders and having an annular briquetting area; axially spaced cooperating ridges provided on the briquetting areas of said inner and outer dies to define opposed briquetting zones of predetermined clearance between said inner and outer dies; annular flanges secured on each side of each of said inner dies and radially extending beyond said inner die ridges; and clearance between said flanges and said track surfaces of less magnitude than said predetermined clearance of said zones.

ALEXANDER J. ROUBAL.

No references cited.