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E. A. JONES.

DRIVING MECHANISM FOR PAPER REFINING ENGINES.

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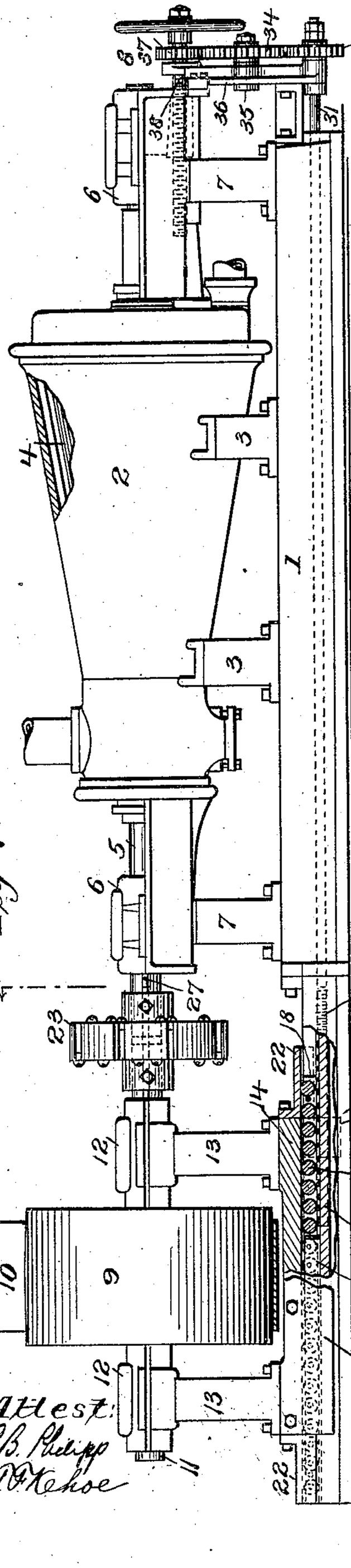

Fig. 1.

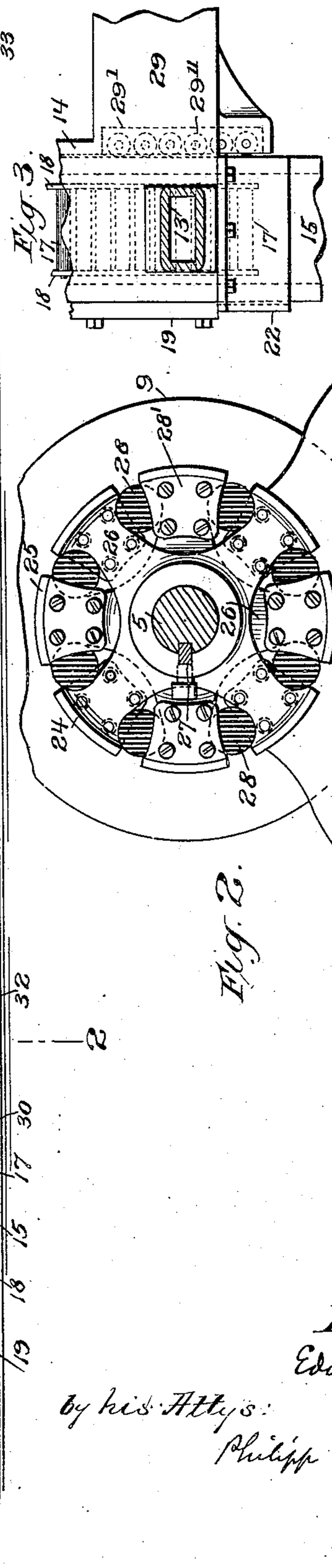

Fig. 3.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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DRIVING MECHANISM FOR PAPER-REFINING ENGINES.

No. 845,302. Specification of Letters Patent. Patented Feb. 26, 1907.

Application filed November 16, 1906. Serial No. 343,697.

To all whom it may concern:

Be it known that I, EDWARD A. JONES, a citizen of the United States, residing at Pittsfield, county of Berkshire, and State of Massachusetts, have invented certain new and useful Improvements in Driving Mechanism for Paper-Refining Engines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in driving mechanism for paper-refining engines, the engines for which the improvement has been particularly designed being those of the Jordan type, which comprise a stationary shell within which rotates an endwise-adjustable core or plug, the shell and core or plug being provided with coacting cutting-knives which as the core rotates comminute or grind up the material to be acted on which is contained in the shell, and which engines have a driving mechanism for rotating said core or plug.

Heretofore, except for certain constructions hereinafter referred to, the mechanism employed for driving this type of engine comprised a belt-and-pulley construction. In this construction the driving-pulley is splined or similarly connected with the shaft of the cutting core or plug, and there is a lateral pull exerted by the belt on the driven pulley, and therefore on the core-shaft, and the latter and the core are displaced laterally, so that the cutting-knives of the core do not coact uniformly at all points with the cutting-points of the shell in grinding the stock, the working efficiency of the engine being thus considerably lessened. When the cutting-core and its shaft are thus displaced from their normal position, a binding action takes place between them and their bearings, which prevents the proper operation of the mechanism as a whole, and particularly the mechanism for giving the core the endwise movement of adjustment. It has been proposed to drive the core or plug of these engines by an electric motor, the cutting core or plug being driven directly by the motor-shaft, such construction being shown and described in Patents Nos. 823,109 and 824,910 to E. C. Crocker. These constructions answer the purposes for which they are designed and are very efficient. It is impossible to employ these constructions, however, in many cases, owing to the fact that in some places where it is desired to use these Jordan engines there are no facilities for obtaining electric power. In such circumstances a belt-and-pulley drive must be employed; and it is the object of the present invention to provide a construction in which the belt and pulley may be used to drive the core and shaft of the refining-engine, which construction shall be free from the disadvantages and objections formerly attendant on the use of the old belt-and-pulley-driven engines.

I have discovered that the defects in the old belt-and-pulley construction may be remedied by rotatably mounting the pulley so that it is adjustable endwise relatively to the shell, the pulley, its shaft, and bearings therefor being carried on or by a support which is adapted to be moved endwise or longitudinally to and from the stationary shell of the engine, and that such construction may be further improved by providing some flexible connection between the shaft of the pulley and the shaft of the core or plug, and also by the provision of means independent of the core or plug and its shaft for moving the pulley and its support endwise to and from the stationary shell of the machine when the core or plug is adjusted. One construction embodying these features which constitute the present invention will now be described in detail.

In the drawings, Figure 1 is a side elevation, partly in section, of a paper-refining engine of the type referred to, certain portions of the same being broken away for illustrative purposes. Fig. 2 is a section on the line 2 2 of Fig. 1. Fig. 3 is a section on line 3 3 of Fig. 2.

Referring now to said drawings, which illustrate a preferred embodiment of the invention, 1 indicates a base, which base may be of any usual or desired construction, and on this base the refining-engine is supported. The refining-engine shown is of the Jordan type and comprises an outer stationary shell 2, supported in any suitable manner, as by standards 3, rising from the base 1, and a cutting core or plug 4, mounted to rotate within the shell. This cutting core or plug 4 is mounted on a shaft 5, journaled in bearings 6 on standards 7, rising from the base 1. The plug and plug-shaft are normally held against endwise movement relatively to the shell. As the engines are used, however, the knives of the core or plug wear down, and an adjustment of the core relatively to the shell

is necessary in order that the knives on the cutting-surface of the core or plug may properly coöperate with the shell in refining the stock. Means are provided, therefore, for both normally holding the plug and plug-shaft against endwise or longitudinal movement relatively to the shell and for giving such movement to the plug and its shaft relatively to the shell as to effect this adjustment, which means include a wheel-and-screw device, such as shown at 8. The plug-shaft 5 and the plug 4 are, as hereinbefore stated and as shown, driven by a belt-and-pulley construction, a pulley suitable for such purpose being shown at 9, the driving-belt 10 therefor leading to any suitable power-shaft (not shown,) as will be understood.

As before stated, the driving-pulley 9 is adjustably mounted, so that it may have an endwise or longitudinal movement relatively to the stationary shell. The pulley is mounted or supported in any suitable manner, so that it may have this desired adjustment, and the construction employed for this purpose may be varied. As shown, there is provided a shaft 11, on which the pulley is carried and by which it is rotated. This shaft is separate from the shaft of the core or plug and is preferably a short shaft, so that there will be the least possible lateral displacement of the said shaft due to the pull of the belt. This shaft is supported in suitable bearings 12, a bearing being provided on each side of the pulley, which bearings are in turn supported by standards 13. In the preferred construction and as shown the pulley-shaft, its bearings, and the standards therefor are all mounted or supported so as to partake of the endwise-adjusting movement. In the construction shown for effecting this purpose there is provided a carriage 14, to which the standards 13 are bolted or otherwise suitably secured. This carriage is adapted to move endwise or longitudinally on a base or bed plate 15, which is shown as separate from the base 1, which supports the refining-engine, though it is obvious that the base 15 may be, if desired, a prolongation of the base 1. This base or bed plate 15 is, as shown, formed with H-shaped portions 16, one of these H-shaped portions being provided on each side of the bed-plate. These H-shaped portions extend upwardly above the plane of the bed-plate proper and form supports for the carriage 14. If desired, the carriage 14 may be moved back and forth directly on these portions 16. To reduce friction, however, and to render the movement of the carriage more even, in the upper part of the H of each portion 16 there is mounted a plurality of rolls 17, these rolls being mounted in and held in position by flanges 18, suitably secured in the upper part of the portions 16. The carriage 14 is supported on these rolls 17, which are arranged to run in oil, the reservoir therefor being formed by the sides of the upper portion of the H-shaped portions 16.

Means are provided for guiding the carriage on the bed-plate and for also retaining the carriage on the bed-plate so that it will not be pulled off by the up-pull of the belt on the driving-pulley. The construction employed, however, may be varied. As shown, there are provided side plates 19, these side plates being bolted or otherwise suitably secured to the sides of the carriage 16. These side plates are formed with projections 20, which projections fit and slide in grooves or recessed portions 21, formed on the outside of each of the H-shaped portions 16. These side plates 20 therefore act both as guides for the carriage 16 and have the further function of retaining the carriage 16 in its place on the rolls against the up-pull of the belt and prevent the carriage from being turned over or displaced by such up-pull. These side plates 20 furthermore also prevent dirt entering to the rolls. For keeping dirt out of the rolls beyond the ends of the side plates there are provided cover-pieces 22, one of these cover-pieces being provided at each end of each portion 16 and secured by being bolted to the carriage.

In the construction so far described it has been found in practice that the carriage 14 is moved or drawn sidewise by the side pull of the belt on the pulley. This sidewise movement or thrust of the carriage against the base on which it is mounted causes a binding action to take place between the carriage and the base. This binding action is undesirable in that it prevents the carriage from being moved freely along the base by the adjusting mechanism, and thus prevents the proper action of said adjusting mechanism. Means are provided, therefore, by the present invention for obviating this difficulty. As shown, the carriage is provided with cross-bars 29, one cross-bar being provided at each end of the carriage. These cross-bars 29 have broadened extremities and are arranged to extend below the plane of the carriage between the supports 16. The inner faces of the cross-bars—that is, the faces lying next the inner faces of the supports 16—are recessed, as shown at 29′. In these recesses are suitably mounted a plurality of vertically-disposed antifriction-rollers 29″, these rollers being arranged to bear against the upper portion of the H-shaped portion 16. This construction provides a roller-bearing by which the friction between the carriage and its support is reduced, thus avoiding the binding action above referred to and permitting the proper movement of the carriage on its support and the proper working of the adjusting mechanism.

To remedy any lateral displacement which may be caused either by the pulley-shaft get-

ting out of line, due to the pull of the belt, or the core-shaft getting out of line, due to the weight of the core, the pulley-shaft and the shaft of the cutting core or plug will preferably be connected by some flexible connection, these two shafts being arranged so that they are in substantial axial alinement. Any suitable flexible connection may be employed to compensate for the lateral displacement which may occur between the contiguous ends of the said shafts. As shown, there is provided a flexible coupling member 23, preferably of the construction shown, which by its flexibility compensates for the lateral displacement of the core-shaft relatively to the pulley-shaft and renders any ordinary displacement of the core-shaft immaterial as far as the working efficiency of the engine is concerned. This coupling comprises two spiders 24 25, each of which has a plurality of arms 26, the number of arms shown being four on each spider. In coupling the two shafts together one of the spiders is made fast by a key and set-screw 27 to the end of the pulley-shaft 11 next the engine, and the other spider is similarly made fast to the end of the core-shaft 5 next the driving-pulley, the spiders being so arranged and placed in position that their arms interlock. The interlocking arms of the spiders are separated by cylinders or plugs of soft rubber 28, which give great flexibility to the coupling. The rubber cylinders or plugs are held in position and the parts of the coupling united by plates 28′, secured to the arms of the spiders. With this construction, in which the driving-pulley is mounted on a separate short shaft and connected with the shaft of the cutting core or plug by the flexible coupling, any lateral displacement of the contiguous ends of the two shafts does not affect in any manner the working efficiency of the engine. The plug and plug-shaft can sag down or become displaced without in any way affecting the pulley-shaft, and the pulley-shaft, if laterally displaced by the up or down pull of the belt, does not affect the working of the plug.

It will be seen that in the construction so far described the carriage supporting the pulley and its shaft is adapted to be moved or adjusted endwise relatively to the shell. If such movement were given it by the adjusting mechanism through the plug-shaft and the coupling member, connecting-pulley, and the plug-shaft, all the strain of the movement would come on the coupling, plug-shaft, and the adjusting mechanism for the latter, and in the case of a flexible coupling, such as shown and described, (and which is preferably used,) such strain would be apt to pull the coupling apart. Means are, however, provided by the present invention independent of the adjusting mechanism for the plug-shaft for so adjusting the pulley, and thus relieving the coupling member, the plug-shaft, and the latter's adjusting mechanism of this strain, and these means will now be described. In the construction shown one of the cross-bars 29, with which the carriage 14 is provided, supports a threaded nut 30, bolted or otherwise suitably secured thereto. Suitably supported on the base 1 is provided a shaft 31, which shaft extends the length of the machine and is provided with a threaded end 32, which works in the threaded nut 30, this shaft being preferably positioned so as to be central of the base 1 and at the lower portion thereof, as shown. The other end of this shaft 30 carries a gear 33, which gear meshes with a gear 34. This latter gear is an intermediate gear and is supported in any suitable manner, as by a short shaft 35, mounted in a hanger 36, suitably secured to the machine. This intermediate gear 34 meshes with a gear 37, which is mounted on the screw-shaft 38 of the adjusting device 8. By this construction when the plug is moved endwise by the screw-shaft 38 of the adjusting mechanism the carriage 14, supporting the pulley, is also given an endwise movement through the shaft 31, which thus relieves the core-shaft and the flexible coupling 23 of strain. In order that the movement given the carriage 14 by the shaft 31 shall be equal to the movement given the plug by the adjusting mechanism, the shaft 38 and the shaft 31 are provided with threads of equal pitch, and the gears 33 and 37 are made equal gears.

What is claimed is—

1. In a refining-engine, the combination of a stationary shell, of a cutting core or plug rotatably mounted within the shell, a plug-shaft on which the plug is supported, mechanism for adjusting the plug and its shaft endwise relatively to the shell, a pulley having a flexible connection with said plug-shaft so as to drive the latter, a support for said pulley adjustable endwise relatively to the shell, guiding means for the pulley-support, and means independent of the plug and plug-shaft for so adjusting the pulley-support, substantially as described.

2. In a refining-engine, the combination of a stationary shell, of a cutting core or plug rotatably mounted within the shell, a plug-shaft on which the plug is supported, mechanism for adjusting the plug and its shaft endwise relatively to the shell, a pulley having a flexible connection with said plug-shaft so as to drive the latter, a base, a carriage on the base for supporting the pulley adjustable endwise relatively to the shell, means for guiding and retaining the carriage on the base, and means independent of the plug and plug-shaft for so adjusting the carriage, substantially as described.

3. In a refining-engine, the combination of a stationary shell, of a cutting core or plug rotatably mounted within the shell, a plug-

shaft on which the plug is supported, mechanism for adjusting the plug and its shaft endwise relatively to the shell, a pulley having a flexible connection with said plug-shaft so as to drive the latter, a base provided with grooves on its outer sides, a carriage on the base for supporting the pulley adjustable endwise relatively to the shell, and guiding and retaining plates fixed to the carriage having projections working in the grooves on the base for guiding and retaining the carriage on the base; substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EDWARD A. JONES.

Witnesses:
FRANK E. BONNEY,
EDWARD B. HULL.