June 13, 1939. L. H. LOGUE 2,162,624

TRANSMISSION DRIVE

Filed May 6, 1935 2 Sheets-Sheet 1

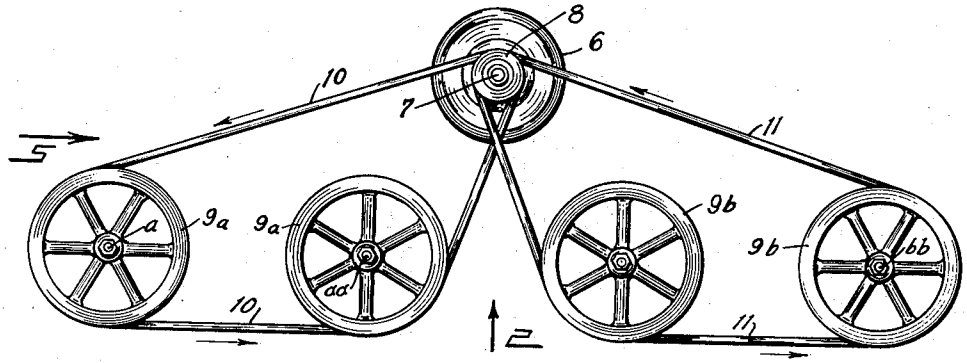


Fig. 1.

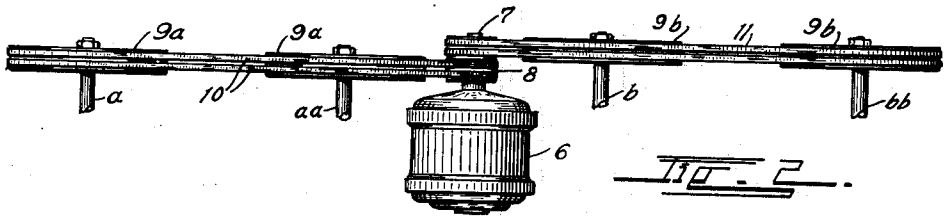


Fig. 2.

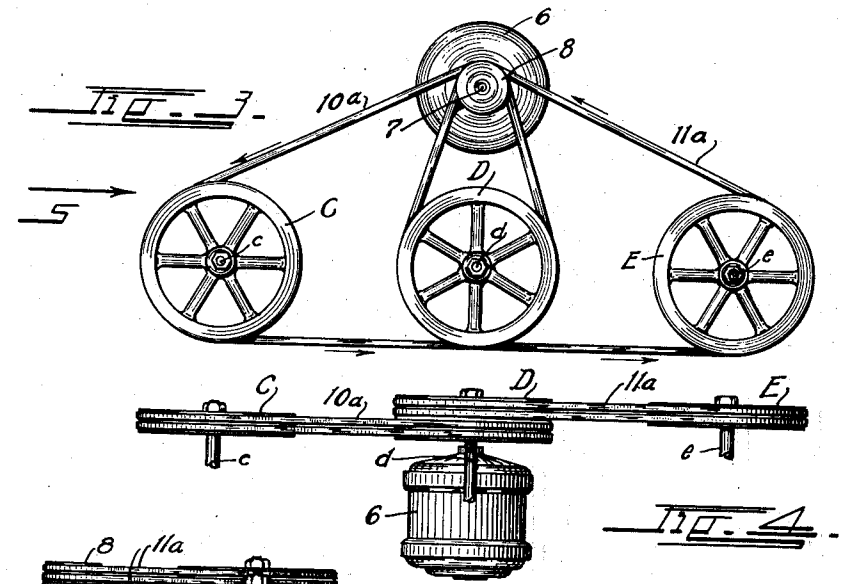


Fig. 3.

Fig. 4.

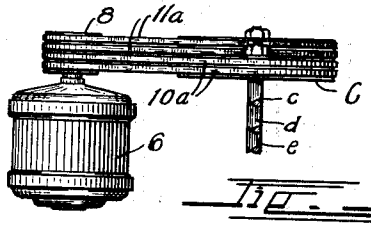


Fig. 5.

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June 13, 1939. L. H. LOGUE 2,162,624

TRANSMISSION DRIVE

Filed May 6, 1935 2 Sheets-Sheet 2

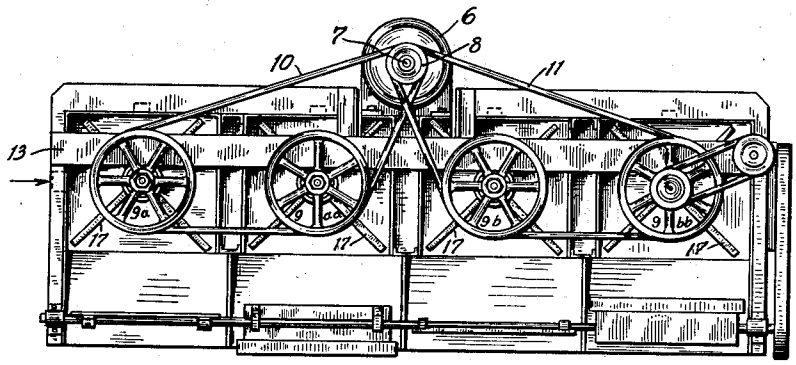


Fig. 6.

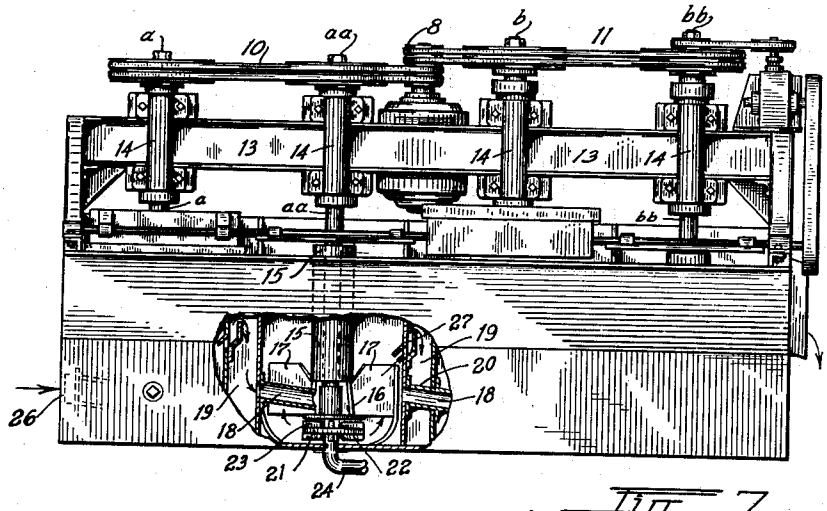


Fig. 7.

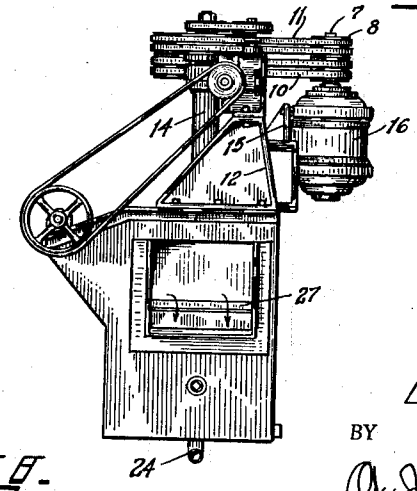


Fig. 8.

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2,162,624

TRANSMISSION DRIVE

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Application May 6, 1935, Serial No. 20,016

3 Claims. (Cl. 74—223)

This invention relates in general to improvements in the art of transmitting power by means of belts and the like, and has been applied more specifically to an improved drive for the impellers of flotation machines for the purpose of driving a plurality of impellers from one motor. The invention is not, however, limited to this use, but can be employed in other machines where two or more members are to be simultaneously rotated at the same speeds, or at relatively the same speeds.

In the concentration of metalliferous ores it is customary to subject ore pulp to froth flotation and for this purpose flotation machines comprising several cells or units are employed. Each cell is provided with a rotary impeller and, where electric drive is employed, it has been customary to drive each impeller from a separate motor.

It is the object of this invention to produce a transmission by means of which two, three, or four parallel, spaced shafts can be rotated from a single motor through the intermediary of belts without the use of drive-shaft or counter-shaft.

The invention can be most clearly explained and most readily understood when reference is had to the accompanying drawings in which it has been illustrated and in which

Figure 1 is a top plan view of a belt transmission in which four parallel shafts are rotated from a single motor;

Figure 2 is a side elevation, looking in the direction of arrow 2 in Figure 1;

Figure 3 is a view similar to that shown in Figure 1 and shows three parallel shafts rotated by a single motor;

Figure 4 is a side elevation of the drive shown in Figure 3;

Figure 5 is an end elevation looking in the direction of arrows 5 in Figures 1 and 4;

Figure 6 is a top plan view of a four cell flotation machine provided with the improved belt drive;

Figure 7 is a side elevation of the machine, with parts broken away to show the construction; and

Figure 8 is an end elevation of the machine.

In the drawings reference numeral 6 designates a motor, which has been illustrated with its drive shaft 7 vertical and provided with a multi-grooved pulley 8. In the example given the pulley 8 has four grooves but may have any other number. The four shafts to be rotated have been designated by *a*; *aa* and *b*; *bb*. The shafts *a* and *aa* are each provided with a pulley 9*a* which pulleys are located in substantially the same plane and are each provided with two grooves preferably V-shaped, with which V-shaped side driving belts 10 cooperate. Belts 10 also cooperate with grooves on the pulley 8. Shafts *b* and *bb* are each provided with a pulley 9*b* of the same shape as pulleys 9*a*, and are provided with grooves for the belts 11, which cooperate with V-shaped grooves on the drive pulley. It will be seen from Figure 2 that pulleys 9*b* are located in substantially the same plane but above pulleys 9*a* for the purpose of alining the grooves with the cooperating grooves of the drive pulley.

It will be seen from Figure 1 that with the pulleys and belts arranged as shown, the several pulleys will be rotated in the same direction. In the drawings the several driven pulleys have been shown as all of the same size but this is, of course, not essential as the size is selected so as to obtain a desired speed of rotation for each shaft. When the drive is employed in connection with flotation machines, the pulleys are, as a rule, the same size.

In Figures 3, 4 and 5 the improved transmission has been shown as applied to a machine having three shafts *c*, *d* and *e* provided with pulleys C, D, and E, respectively. In this embodiment the center shaft, marked *d*, is provided with a pulley having as many grooves as both the pulleys C and E. The pulley C has its two grooves alined with the lower two grooves on pulley D while pulley E has its grooves alined with the two upper grooves on pulley D. Belts 10*a* enclose pulleys C, D and 8, while belts 11*a* enclose pulleys D, E and 8. The direction of rotation has been indicated by arrows and the shafts will all rotate in the same direction as the drive shaft.

In the embodiment illustrated in Figures 1 and 2 the two pair of pulleys, 9*a* and 9*b* are independent so that if either belt 10 or 11 can be removed without affecting the operation of the other pair. In the embodiment shown in Figures 3, 4 and 5, pulley D is driven by both sets of belts 10*a* and 11*a*, and by removing either set of belts either one of pulleys C or E can be stopped.

In Figures 6, 7 and 8, the belt transmission has been shown as applied to a flotation machine comprising four cells and which corresponds to the transmission illustrated in Figures 1 and 2.

Since the invention is not concerned with the specific construction of the flotation cells this has not been shown in Figures 1 to 6. The machine illustrated in Figures 6 to 8 has upwardly

extending end brackets 12 which serve as supports for the ends of the channel iron beam 13 to which the bearings 14 are secured. The impeller shafts *a*, *aa*, *b* and *bb* are mounted for rotation in the bearings.

The motor 6 is located midway between the two shafts *aa* and *b*, in the four cell machine illustrated, and in a three cell machine the motor is located directly opposite the center shaft. The reason for locating the motor symmetrically with respect to the two sets of shafts is primarily this, that the belts will then be interchangeable, thus necessitating only one length of belt. The motor is supported on a bracket 15 supported from the cell and the beam 13.

The machine illustrated in Figures 6, 7 and 8 is made up of four cells all of which are substantially the same and in Figure 7 a part of the outer wall of the machine has been broken away to disclose the construction. The impeller shaft *aa* extends downwardly through the cylindrical tubular member 15 that terminates in a slightly enlarged housing 16 from which a plurality of baffle plates 17 extend radially. An intake conduit 18 connects the overflow conduit 19 with the interior of the housing 16. A flat flange 20 surrounds the lower end of housing 16 and cooperates with the upper surface of the impeller 21, which is provided with two sets of impeller blades 22 and 23. A pulp supply pipe 24 communicates with the interior of each cell directly below each impeller. The feed to the machine enters at 26 which corresponds to the intake opening of the conduit 18 of the second cell, which has been broken away, and thru pipe 24.

When the impeller is rotated the pulp and air that enters through conduit 18 is sucked into the center of the impeller, together with other air that enters through the tubular member 15 and this mixture of air and pulp is thrown outwardly by the centrifugal action of the impeller. The pulp that is fed to the lower side of the impeller through pipe 24 will be thrown outwardly by the blades 22, and mixed with the air that enters through the tubular member 15 and the conduit 18. The baffles 17 stop the aerated pulp from rotating and the bubbles pass upwardly and form a froth while the pulp passes out over the adjustable weir 27 and into the overflow conduit 19 from which it passes into the next cell where it is subjected to further agitation and aeration.

The belt transmission shown employs a plurality of V-shaped side driving belts cooperating with multi-grooved pulleys but in the claims the term "belt" will be used to designate any number of belts or the like, which function as a single belt.

When the embodiment of the invention illustrated in Figures 1 and 2 is employed one motor will operate four flotation cells and it is obviously possible to add another or as many cells as desired to each group by providing the necessary additional belts and providing the pulleys with the additional grooves desired, but four cells are believed to be the optimum number to be operated from a single motor.

It is also possible to carry forward the invention illustrated in Figures 3 and 4 to include any reasonable odd number of cells. The embodiment illustrated in Figures 1 and 2 is best suited where an even number of cells are to be operated while that shown in Figures 3 and 4 is employed where an odd number of cells are to be operated.

The above arrangement of the belt drive transmission makes it possible to greatly reduce the number of motors required and since one motor of a given horsepower can be bought for less than three or four motors of the same total horse power, a considerable saving can be effected by the use of this transmission.

Another advantage of this transmission is that it dispenses with the need of a line shaft and simplifies the installation.

It will be noted that by moving shafts *aa* and *b*, of Figures 1 and 2, together, the limit of this movement will be to merge these two shafts into a single shaft designated as *d* in Figures 3 and 4, and the groups comprising the two pair of driven shafts will then have one shaft in common.

Having described the invention, what is claimed as new is:

1. A transmission drive comprising, a series of three driven members, a driving element, a driving connection between the driving element and a plurality of the driven members, and a second driving connection between the driving element and a different plurality of the series, one of the driven members being common to each plurality.

2. A transmission drive comprising a row of three driven members, a driving element disposed in spaced relation to the row and adjacent the intermediate driven member of the row, and driving connections between the driving element and different pluralities of the row, each plurality consisting of one of the outermost driven members of the row and the intermediate driven element, the latter being common to each plurality.

3. A transmission drive comprising, a row of three driven members, a driving element disposed in spaced relation to the row adjacent the intermediate driven member of the row, and two driving connections of substantially uniform length between the driving element and different pluralities of the row, the intermediate member being common to each plurality.

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