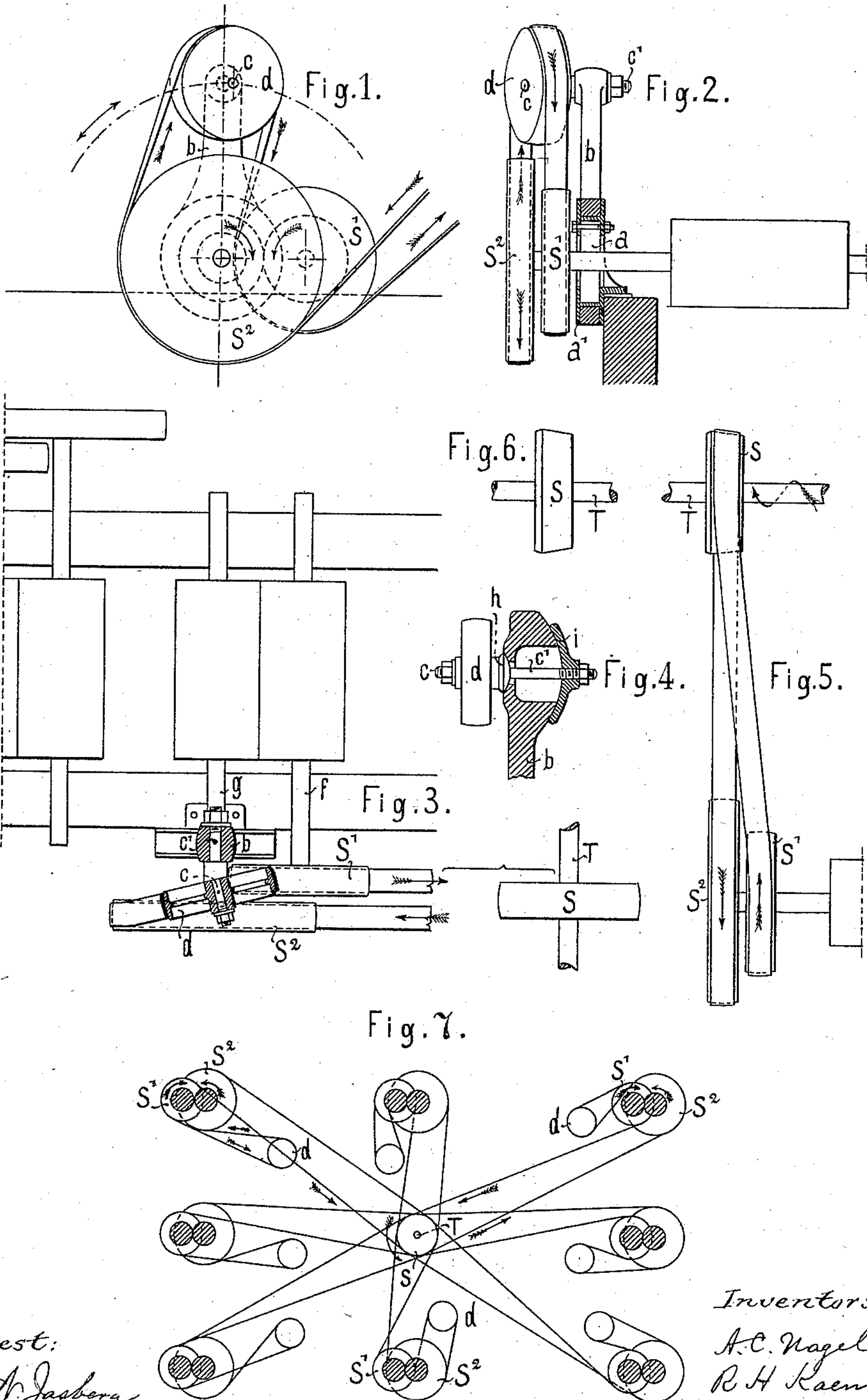


(No Model.)

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DRIVING GEAR.

No. 335,832.

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DRIVING-GEAR.

SPECIFICATION forming part of Letters Patent No. 335,832, dated February 9, 1886.

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To all whom it may concern:

Be it known that we, AUGUST CHRISTIAN NAGEL and REINHOLD HERMANN KAEMP, both citizens of the free State of Hamburg, and
5 ADOLF WILHELM FRANZ GEORG LINNENBRÜGGE, a subject of the King of Prussia, all three residing in Hamburg, German Empire, have invented new and useful Improvements in Driving-Gears, of which the following is a
10 specification.

Our invention relates to roller-mills and other machines having two parallel shafts, provided each with a pulley for operating the same by means of a strap or other flexible power-con-
15 veying medium; and the improvements consist in arranging the said pulleys, which we shall call the "roll-pulleys," in different planes close to each other, and in combining there- with an oblique tension and guiding pulley
20 adapted to lead the strap from one of the said roll-pulleys to the other.

Moreover, they consist in means for adjust- ing the position of the tension and guiding pulley in respect to the roll-pulleys, and in
25 combining with the latter and the tension and guiding pulley a conical driving-pulley.

On the annexed sheet of drawings our im- proved driving-gear is represented in combi- nation with the rolls of a roller-mill by Fig-
30 ure 1 in front elevation, by Fig. 2 in a sec- tional side view, and by Fig. 3 in sectional plan. In the latter figure a portion of a sec- ond pair of rolls is shown. Fig. 4 is a guid- ing-pulley with section of a modified arrange-
35 ment of the adjusting device. Fig. 5 repre- sents a portion of the gear with conical driv- ing-pulley. Fig. 6 is a view of the said con- ical pulley. Fig. 7 shows the improved gear in different positions relatively to the driving-
40 pulley.

For the purpose of operating roller-mills solely by means of straps various systems of driving-gear, in which tension and guiding pulleys are employed, have been contrived;
45 but all these systems present certain incon- veniences. In many of them the shaft carry- ing the driving-pulley requires to be placed in a particular definite position in respect to the mill, usually vertically below the same, so

that these systems are not adapted for the 50 transmission of power to the mill from a shaft having a materially-different position. In other cases two straps are employed, one for transmitting motion from the main driving- pulley to a counter-shaft or to one of the two 55 roll-pulleys, and another one for the transmis- sion from the counter-shaft to both roll-pulleys, or from one roll-pulley to the other, the latter strap being conducted over a tension and guiding pulley, while the main strap is with- 60 out such pulley. This system, indeed, allows the main driving-pulley to be arranged in any desirable position, but it renders necessary the use of at least five pulleys, while usually six are employed. 65

A further disadvantage of all the existing systems is this, that the shafts of the two rolls are pressed by the driving-straps at the oppo- site ends against their bearings, and that these are consequently caused to wear out in such a 70 manner that the parallelism of the rolls is im- paired.

Finally, it may be mentioned that in mills with two pairs of rolls the said pairs are usu- ally so coupled by the straps that when from 75 any reason one pair has to be stopped it is im- possible to work on with the other one.

By means of our improved system of driv- ing-gear these disadvantages are obviated.

Referring to Figs. 1, 2, and 3, *f* and *g* are the 80 two roll-shafts, carrying at their ends, being on the same side of the machine, respectively, the roll-pulleys *S'* and *S''*, which may be of like or different diameter. These pulleys, be- ing larger in diameter than the rolls, are placed 85 by the side of each other with a small space between them.

S is the driving-pulley, keyed on the line of shafting *T*, and *d* the guiding-pulley. From the driving-pulley *S* the strap runs to the roll- 90 pulley *S''*, thence over the guiding-pulley *d*, and from the same around the second roll- pulley, *S'*, and back to the pulley *S*. The guid- ing-pulley *d* is placed in respect to the pul- leys *S'* and *S''* obliquely in such a manner that 95 the strap coming from *S''* will run properly upon the same, and that as it leaves the pulley *d* it will likewise be caused to run on the pulley

S' in the manner required in strap-gearing. The said guiding-pulley *d* rotates on an axle mounted on an arm or carrier, *b*, and which, on account of the described position of the pulley, is arranged at an angle to the shafts *f* and *g*. Preferably this axle consists in a pin, *c*, made with a part, *c'*, forming an angle with *c*, the said part *c'* being inserted into the carrier *b* in a position parallel to the shafts *f* and *g*, and having at its end a screw-thread with nut for securing it, so that when the said nut is slackened the pin *c* may be turned on its part *c'* for the purpose of adjustment of the pulley *d* to the requisite angular position in respect to the pulleys S' and S².

Another mode of attachment of the pin *c* to the carrier *b* is shown by Fig. 4. In this case a spherical collar, *h*, is formed upon the pin *c*, and its part *c'* is arranged in a line with *c*. The said collar engages in a recess in the carrier *b*, while on the end of the part *c'* is placed a large washer, *i*, fitting to a recessed spherical boss on the carrier *b*. This arrangement allows the pin *c* to be adjusted within certain limits to any desired angle, while by means of the disposition described first the adjustability of the pin is limited to its rotation on the surface of a cone having the center line of the part *c'* for its axis.

The carrier *b* is so constructed that it may be rotated about an axis parallel to the shafts *f* and *g*, or coinciding with one of them. According to the drawings, the said carrier is for this purpose made with an annular part, with which it is slipped on a flanged ring or circular body, *a*, permanently fixed to the frame of the machine, and it is secured to the ring by a plate, *a'*, adapted to press on the annular part of the carrier *b*, and by screw-bolts passed through the ring *a* and the plate *a'*. When the nuts of the said bolts are slackened, the carrier *b* with the pulley *d* may be turned on the ring *a*, and the strap thereby tightened, the said pulley being thus also made serviceable as tension-pulley.

In respect to the co-operation of the driving-pulley S with the two roll-pulleys S' and S², which are placed by the side of each other, it requires to be observed that the two strap parts passing, respectively, from S' to S and from S to S² do not run with their center lines (or their edges) in a plane parallel to the planes of the pulleys. If the pulley S is at a considerable distance from the pulleys S' and S², this deviation of the strap parts from their true course may be counterbalanced and the danger of the strap slipping off the pulleys avoided by making the pulley S sufficiently convex and by placing it with its central plane opposite to the middle of the space between the pulleys S' and S²; but if the distance of S from S' and S² is small, it is preferable to make the pulley S conical and to mount it on the driving-shaft so that it will be opposite to the pulley S², which is to receive the strap from S, and that its largest diameter will be in a plane

with the edge of S², that is turned away from S', as is shown by Fig. 5. In consequence of this arrangement and the known tendency of a strap when passing around a conical pulley to run toward the thicker end of the same the strap, leaving the pulley S' at an angle, and likewise running in an oblique direction upon S, will be maintained on S during its course around this pulley, and it will thereupon run straight upon the pulley S². It is, however, advantageous to make the pulley S somewhat wider than the other pulleys, and in the case of the arrangement shown by Figs. 5 and 6 it is advisable to slightly bevel the pulley S at its thick end.

The advantages which the described driving-gear presents are—

First. It allows the mill provided therewith to be placed in any desired position relatively to the driving-shaft T, provided, of course, that the roll-shafts be parallel to the shaft T. This will be seen especially from Fig. 7.

Secondly. Separate straps, which are not kept tight by a tension-pulley, are avoided.

Thirdly. The number of pulleys is reduced as much as is at all possible—i. e., to four.

Fourthly. The pull of the strap acting in like direction and on like ends of the roll-shafts, the wear of the bearings of the said shafts resulting from such pull will not affect the parallelism of the rolls.

Fifthly. In mills with two pairs of rolls, as shown in Fig. 3, each pair may be driven independently of the other one, so that either of them may be stopped while the other pair continues to operate.

In the foregoing description the means for transmitting motion from the pulley S to the pulleys S' and S² has been supposed to be a strap. Instead of the same, however, any other flexible and suitable power-transmitting medium—such as a rope or a plurality of parallel ropes—may be employed, provided only that the rims of the pulleys be formed in corresponding manner, as is universally known.

We claim as our invention—

1. In machines having two parallel shafts, *f* and *g*, provided at the like ends, respectively, with the pulleys S and S², arranged in different planes, the combination, with the said pulleys and a driving-pulley, S, of a tension and guiding pulley, *d*, placed obliquely to the pulleys S' and S², and a strap or its described equivalent running from the driving-pulley S over the pulleys S' and S² and the pulley *d*, substantially as and for the purpose described.

2. The combination, with the parallel shafts *f* and *g*, provided with the pulleys S' and S², arranged in different planes, the driving-pulley S, and a strap or its described equivalent, of a tension and guiding pulley, *d*, rotating on an axle that forms an angle with the shafts *f* and *g*, the said axle being mounted on a rotatively-adjustable carrier *b*, substantially as specified.

3. The combination, with the parallel shafts *f* and *g*, provided with the pulleys *S'* and *S*², arranged in different planes, a tension and guiding pulley, *d*, placed obliquely to the pulleys *S'* and *S*², and a strap running over the said pulleys, of a conical driving-pulley, *S*, as and for the purpose set forth.

In testimony whereof we have hereunto set

our hands in the presence of two subscribing witnesses.

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REINHOLD HERMANN KAEMP.

ADOLF WILHELM FRANZ GEORG LINNENBRÜGGE.

Witnesses:

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