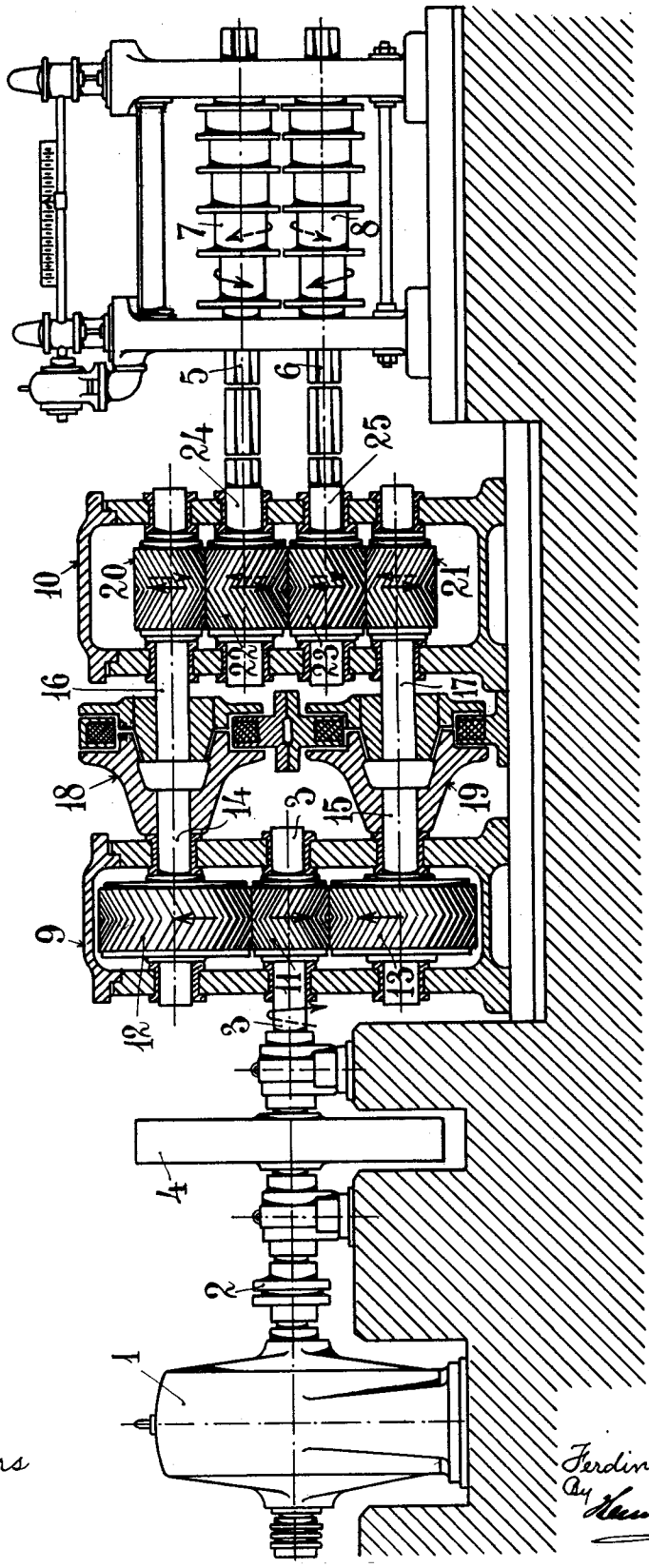
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REVERSING MECHANISM.

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REVERSING MECHANISM.

1,077,519. Specification of Letters Patent. Patented Nov. 4, 1913.

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To all whom it may concern:

Be it known that I, FERDINANDO GATTA, a subject of the King of Italy, residing at Turin, Italy, have invented certain new and useful Improvements in Reversing Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, 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, and to letters or figures of reference marked thereon, which form a part of this specification.

In existing reversible rolling mills the reversal of the motion of the rolls has been effected hitherto by reversing the direction of motion of the motor driving the mill. This arrangement obviously precludes the use of fly-wheels and consequently requires great driving power and entails considerable erecting and running expenses.

Now this invention has for its object to remedy the above drawbacks by providing a rolling mill with reversing mechanism which shall enable the rolling mill to be driven by a motor revolving always in one and the same direction, and shall therefore allow of the use of flywheels.

The reversal of the motion of the rolls is effected in the reversing mechanism according to this invention by means of suitable transmitting devices adapted to be coupled one to another by suitable clutches provided between the motor and the rolling mill.

One form of this invention is illustrated by way of example in the accompanying drawing which is a longitudinal sectional elevation of my improved reversing mechanism applied to a rolling mill.

1 designates motor of any suitable type (electric, hydraulic, steam etc.) coupled by a safety coupling 2 to the main or power shaft 3 on which a fly-wheel 4 is fixed. The motion of the main shaft 3 (which revolves always in one and the same direction; for instance as indicated by the arrow) is transmitted to the shafts 5 and 6 of the two rolls 7 and 8 of the rolling mill by means of transmitting and reversing devices contained in two casings 9 and 10, and also by means of clutches provided between these two casings.

The transmission of the motion is as follows:—By means of a toothed wheel 11, which is preferably made in one piece with the shaft 3 and which gears with two toothed wheels 12 and 13 arranged together with the wheel 11 in the casing 9, the motion is transmitted to counter shafts 14 and 15, on which the wheels 12 and 13 are respectively fixed. From the counter shafts 14, 15 which revolve in the same direction, the motion may be transmitted to one or the other of two intermediate shafts, 16, 17 (mounted in the casing 10 and coaxial respectively with the shafts 14, 15) by engaging one or the other of two distinct intermediate clutches 18, 19 which may be of any type, but are preferably of the electromagnetic frictional type as shown. By means of toothed wheels 20, 21, on the intermediate shafts 16 17, respectively, the motion is transmitted to intergearing toothed wheels 22, 23 and through these to driven shafts 24, 25. The transmission of the motion of the shafts 24, 25 respectively to the shafts 5, 6 of the respective rolls 7 and 8 of the rolling mill, is effected as in the ordinary rolling mills by means of coupling sleeves and extension pieces. The toothed wheels of the transmitting and reversing mechanism above described have preferably double-helical teeth as shown, but they may have any other kind of teeth.

The operation of the improved reversible train is as follows:—The motor (shown as an electric motor in the drawing) revolves always in one and the same direction, and both the two clutches 18 and 19 are assumed to be out of engagement. If now for instance the clutch 18 be moved into engagement, the motion of the counter shaft 14 will be transmitted to the intermediate shaft 16 and through the latter to the toothed wheel 20. Consequently also the toothed wheels 22, 23 and therefore the rolls 7, 8 will rotate in the direction indicated by full arrows. If, however, the clutch 18 be disengaged and the clutch 19 be engaged, the rolls will be rotated in the opposite direction to the preceding one, that is they will rotate in the direction indicated by the dotted arrows.

From the foregoing it will be seen that the improved reversing mechanism enables the motion of the rolls to be reversed while being driven by a motor that is revolving always in one and the same direction. A flywheel may therefore be used.

It is to be noted in order to obtain a practical advantage from the use of a flywheel, that the main or power shaft 3, must revolve at a sufficiently high speed, (exceeding 150 revolutions per minute) which will be generally higher than the speed of rotation of the rolls of the rolling mill which must make only about 60 to 80 revolutions per minute. Consequntly the improved transmitting and reversing mechanism must also be adapted to produce a reduction of speed in transmitting the motion of the main shaft 3 to the rolls 7, 8. This is effected in the example shown by a suitable selection of the diameters of the transmitting toothed wheels 11 and 12, 13 between which a first reduction of speed takes place and besides by a suitable selection of the diameters of the wheels 20, 21 and 22, 23 between which a further reduction of speed is realized.

In the form of reversible rolling mill shown in the figure and hereinbefore described the transmission of the motion between the driving shaft 3 and the shafts 5, 6 of the rolls of the rolling mill is effected by means of a mechanism constituted substantially by seven wheels.

The reduction of speed from the driving shaft 3 to the roll shafts 5, 6 is effected in the construction shown in the figure in part during the transmission of the motion between the wheels 11 and 12, or 13 and in part during its transmission between the wheels 20, 21 and 22 or 23.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. The combination with a power shaft and a plurality of driven shafts geared together, of a plurality of countershafts arranged to be driven from the power shaft, a like plurality of intermediate shafts alined with the counter-shafts, and clutches between the countershafts and their alined intermediate shafts, said intermediate shafts arranged to drive the driven shafts.

2. The combination with a power shaft and a plurality of driven shafts, of a plurality of countershafts arranged to be driven from the power shaft, a like plurality of intermediate shafts alined with the countershafts, clutches between the countershafts and their alined intermediate shafts, and intermeshing gear wheels on said intermediate and driven shafts whereby the latter may be driven in opposite directions.

3. The combination with a power shaft and a plurality of driven shafts, of a plurality of countershafts arranged to be driven from the power shaft, a like plurality of intermediate shafts alined with the countershafts, clutches between the countershafts and their alined intermediate shafts, intermeshing gear wheels on the driven shafts, and gear wheels on the intermediate shafts gearing with said intermeshing gear wheels.

4. The combination with a power shaft, and a pair of driven shafts geared together, of a pair of countershafts arranged to be driven from the power shaft, a pair of intermediate shafts alined with the counter shafts, and alternately operable clutches between the counter shafts and their alined intermediate shafts, the latter shafts arranged to drive the driven shafts.

5. The combination with a power shaft and a pair of driven shafts geared together, of a pair of countershafts, a gear on the power shaft, gears on the countershafts meshing with the gear on the power shaft, a pair of intermediate shafts alined with the countershafts, alternately operable clutches between the latter and their alined shafts, gears on the driven shafts, and gears on the intermediate shafts meshing with the gears on the driven shafts.

6. The combination with a power shaft, a motor for driving the same in one direction, and a fly wheel fixed on the shaft, of a casing in which the latter is journaled, a driving gear fixed on the shaft within the casing, two counter shafts journaled in the casing, a gear wheel on each shaft in mesh with the driving gear and of larger diameter than the latter, a second casing, intermediate shafts journaled in the latter in axial alinement with the countershafts, driven shafts within the second casing, clutch members to connect the counter and intermediate shafts, and means to rotate the driven shafts in opposite directions.

7. The combination with a power shaft, a motor for driving the same in one direction, and a fly wheel fixed on the shaft, of a casing in which the latter is journaled, a driving gear fixed on the shaft within the casing, two counter shafts journaled in the casing, a gear on each shaft in mesh with the driving gear and of larger diameter than the latter, a second casing, intermediate shafts journaled in the latter in axial alinement with the countershafts, clutch members to connect the counter and intermediate shafts, two driven shafts journaled in the second casing between the intermediate shafts, gears on the latter shafts and gears on the driven shafts in mesh with and of larger diameter than the gears on said intermediate shafts.

8. The combination with a power shaft, a motor for driving the same in one direction, and a fly wheel fixed on the shaft, of a casing in which the latter is journaled, a driving gear fixed on the shaft within the casing, two counter shafts journaled in the casing, a gear on each counter shaft in mesh

with the driving gear and of larger diameter than the latter, a second casing, intermediate shafts journaled in the second casing in axial alinement with the countershafts, friction clutch members to connect the counter and intermediate shafts, two driven shafts journaled in the second casing between the intermediate shafts, and gears on the driven shafts in mesh with and of larger diameter than the gears on said intermediate shafts.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

FERDINANDO GATTA.

Witnesses:

JOCELYN GOUBEYRAN,

FRANCESCO SIMONI.