No. 628,190. Patented July 4, 1899.

I. STONE.

ELECTRICAL SLOW STARTING DEVICE FOR MACHINERY.

(Application filed Aug 5, 1898.)

(No Model.)

Fig. 1.

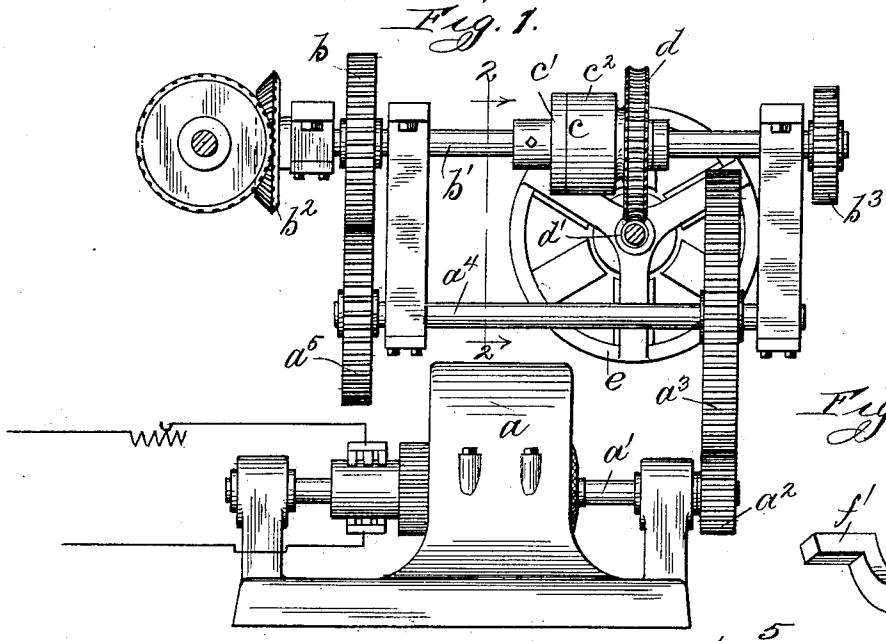


Fig. 6.

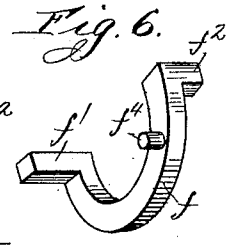


Fig. 3.

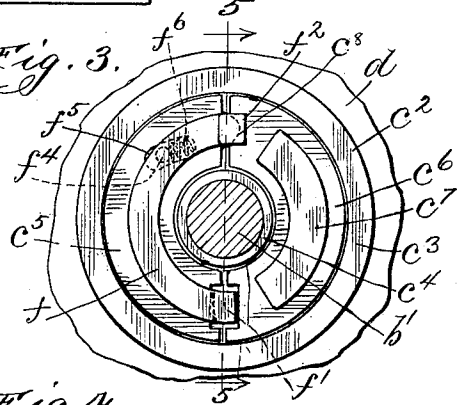


Fig. 2.

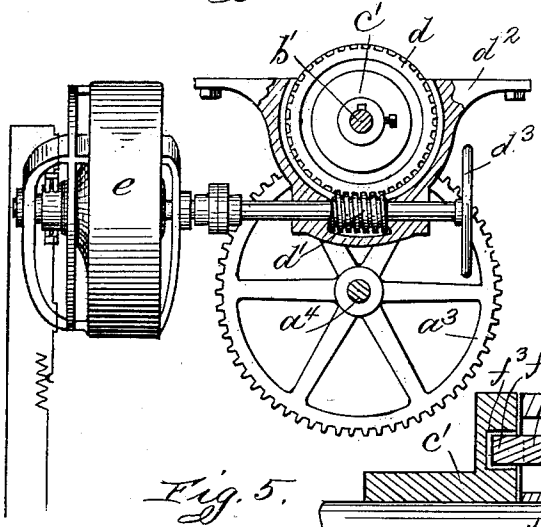


Fig. 4.

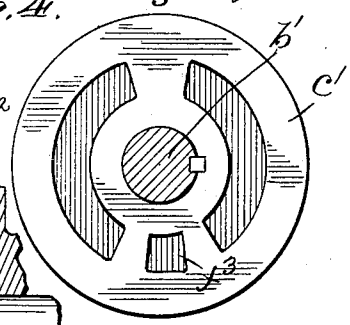
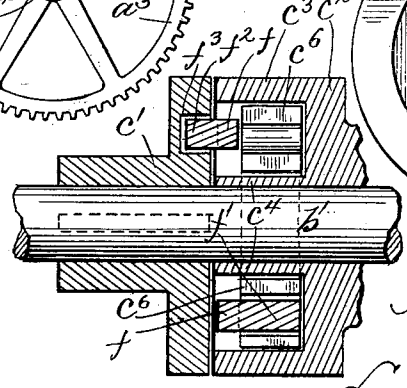


Fig. 5.



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UNITED STATES PATENT OFFICE.

IRVING STONE, OF CHICAGO, ILLINOIS, ASSIGNOR TO G. A. EDWARD KOHLER AND FRANKLIN W. KOHLER, OF SAME PLACE.

ELECTRICAL SLOW-STARTING DEVICE FOR MACHINERY.

SPECIFICATION forming part of Letters Patent No. 628,190, dated July 4, 1899.

Application filed August 5, 1898. Serial No. 687,790. (No model.)

To all whom it may concern:

Be it known that I, IRVING STONE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electrical Slow-Starting Devices for Machinery, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an electrical slow-starting device for machinery, my object being to provide means whereby various kinds of machinery driven by electric power may be slowly and gradually started without sudden shock or jar to thereby accomplish the starting of the same without endangering delicate mechanism or delicate products handled by the machine.

My invention is particularly applicable to the starting of large perfecting-presses used in newspaper-work, in which it is essential that the press be started gradually and without sudden shocks or jars, as otherwise the paper in the rolls will be torn and delicate and nicely-adjusted mechanism will be deranged. In making up the press and fitting the stereotype-plates to the cylinders it is desirable to start the press sufficiently to turn the rollers over to expose different quadrants of the surface for the application of the plates, and considerable difficulty has been experienced in providing a motive power which can be readily started and stopped to secure this necessary small movement of the mechanism. In accordance with the present invention I am enabled to drive the press through any desired small distance in making up the press and readily stop the same at the desired point.

While my invention has been particularly designed for printing-press work it is equally applicable to other machinery where a gradual starting without shocks or jars is desired.

In accordance with my invention I provide an electric motor of sufficient power to drive the machine under normal operation, the motor being connected either direct to the machine or through such reduction-gears as may be necessary, and, in addition, I provide an auxiliary motor of comparatively small capacity which is connected with the machine through slow-motion gearing, such as high-reduction gears, the auxiliary motor being connected with the machine through the agency of a clutch and having power sufficient to overcome the inertia of the machine and start the same in motion. After the machine has been started from rest by the small motor to thereby, due to the interposition of the slow-motion gearing, gradually start the same and overcome the inertia of the moving parts the main motor is thrown into circuit and further increases the speed to the normal, at which the machine continues to operate. As the speed of the machine thus rises above that of the auxiliary motor the latter is disengaged by the action of the clutch and may be cut out of circuit and brought to rest. In this manner the first or initial motion of the press during the period when shocks and jars usually occur is accomplished by the auxiliary motor geared through high-reduction gears, which prevent the transmission of sudden movements to the machine, and after the speed has risen to a point where the main motor can continue the operation of the machine the latter is thrown in, and as the main motor has been started in motion, due to its connection with the machine, the driving current in traversing the armature of the main motor does not have to overcome its own inertia, and thus the motor assumes the load without jerk or shock. When it is desired to move the machine slightly in making up the press or in adjusting the parts, the motion may be accomplished entirely by the auxiliary motor, which, due to its high-reduction connection, readily adapted itself to the movement of the machine through small distances.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 is a view in elevation of the structure of my invention. Fig. 2 is a view on line 2 2, Fig. 1. Fig. 3 is a view of one member of the clutch. Fig. 4 is a view of the other member. Fig. 5 is a sectional view of the clutch. Fig. 6 is a detached view of the operating-arm of the clutch.

Like letters refer to like parts in the several figures.

The shaft a' of the main motor a carries a

pinion a^2, engaging a gear-wheel a^3 on the counter-shaft a^4, carrying a gear-wheel a^5, engaging a gear-wheel b on the driving-shaft b', carrying at the opposite ends the gear-wheels b^2 b^3, geared with the machine, which in the present instance is a printing-press. Upon the shaft b' is keyed one member c' of a clutch c, the other member c^2 being loose upon the shaft and connected to a worm wheel d, engaging with a worm or screw d', mounted in bearings in a bracket d^2 and carrying at one end a hand-wheel d^3 and coupled at the other end to the auxiliary motor e.

The clutch which I have illustrated forms no part of my invention in its individual capacity, and any suitable form of clutch may be employed which will permit the auxiliary motor to drive the machine in starting and which will disengage the auxiliary motor when the machine driven by the main motor moves at a higher speed than the auxiliary motor. The member c^2 has a rim c^3 and a hub c^4, between which rest the curved friction-blocks c^5 c^6, resting together at one end by a knuckle-joint c^8, permitting a slight rocking movement of one on the other, and the opposite ends are cut away to form a rectangular opening within which fits the lug f' on the arm f, the lug f^2 fitting in a hole f^3 in the face of member c' of the clutch. A pin f^4 is carried on arm f and fits in the oblique oblong hole f^5 in block c^5, and a spring f^6 presses against pin f^4. The block c^6 carries a counterweight c^7 to balance the clutch. One end of the spring f^6 bears against the pin f^5 on the arm f and the other end bears against the block c^5. When the auxiliary motor is the driver and the rim c^3 is driven thereby in the direction of the hands of a clock, the arm f is held back by the inertia of the member c', and the lug f' will therefore be turned so as to throw the blocks c^5 c^6 into engagement with the rim c^3. The continued revolution of the rim c^3 will then, through the arm f and member c', drive the shaft b'. When the main engine is started, rotating the shaft b' at greater speed than it is thus driven by the auxiliary motor, the arm f^2 will be turned in the direction opposite to that in which it was originally moved and into the position shown in Fig. 3, so that the blocks c^5 c^6 are disengaged from the rim c^3 and the shaft b' will then be driven by the main engine alone and the auxiliary motor may be stopped.

In a practical installation I have employed with a main motor of forty-horse power and five hundred revolutions per minute when at normal speed an auxiliary motor of five-horse power with a normal speed of two hundred revolutions. When the auxiliary motor is running at full speed, the armature of the main motor makes about fifteen revolutions per minute. With the armature of the main motor running at this speed current may be turned on the main motor and the motor takes the load and the speed gradually increases to the normal without appreciable jerk or unsteadiness.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a shaft to be driven, of a motor geared with said shaft to normally drive the same, an auxiliary motor and slow-motion gearing interposed between the same and said shaft, and an automatic clutch having one member connected with said slow-motion gearing and the other member connected with said shaft, said members being arranged to be locked together when the auxiliary motor is the driving part and to be disengaged when the same becomes the driven part, whereby the auxiliary motor employed for starting may become automatically disengaged, substantially as described.

2. The combination with a shaft to be driven, of a motor having the rotatable part thereof geared with said shaft to normally drive the same, an auxiliary motor, a worm or screw adapted to be driven by said auxiliary motor, a worm-wheel meshing with said worm or screw and an automatic clutch having one member connected with said worm-wheel and the other member connected with said shaft, said members being arranged to be locked together when the worm-wheel is the driving part and to be disengaged when the worm-wheel becomes the driven part, whereby the auxiliary motor employed for starting may become automatically disengaged, substantially as described.

In witness whereof I have hereunto subscribed my name in the presence of two witnesses.

IRVING STONE.

Witnesses:
G. A. EDWARD KOHLER,
W. CLYDE JONES.