(No Model.) 2 Sheets—Sheet 1.

J. S. MASTERMAN.

REVERSING MECHANISM FOR MACHINERY.

No. 341,491. Patented May 11, 1886.

Fig. 1.

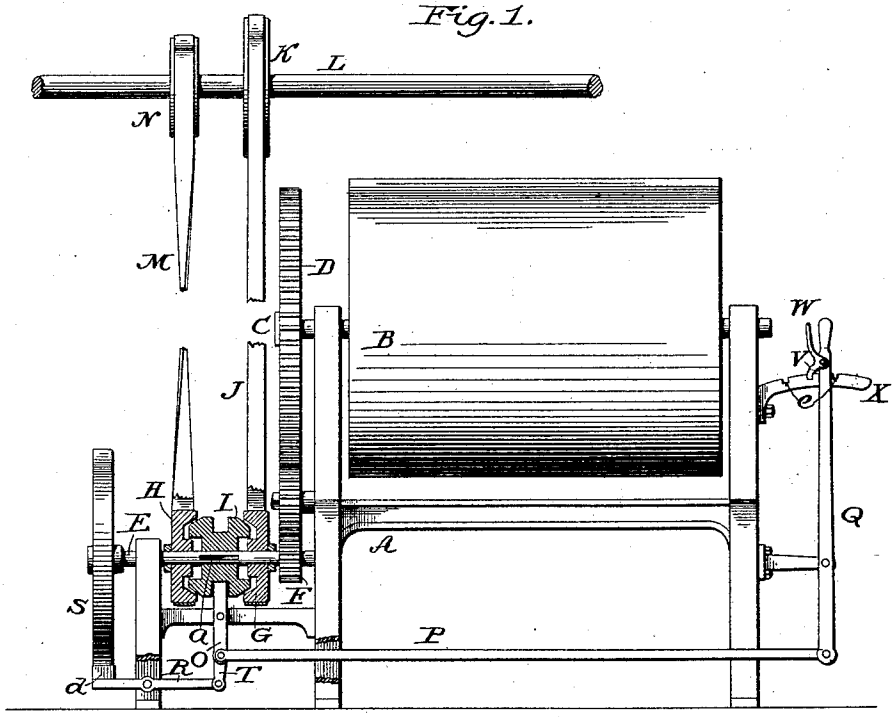
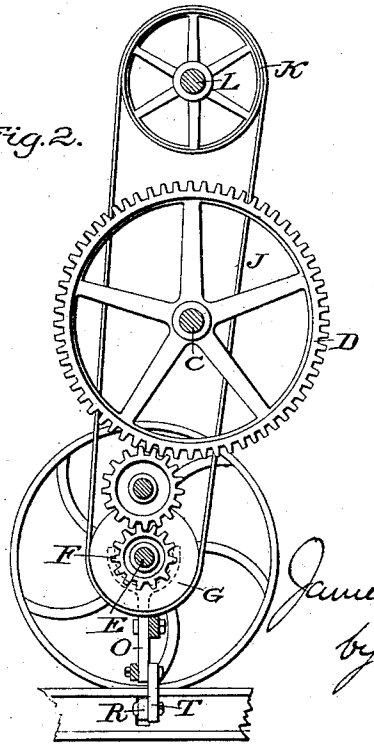


Fig. 2.



Witnesses:
James F. DuHamel.
Walter D. Dodge

Inventor:
James Seeley Masterman,
by Dodger & Son,
his Attys.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

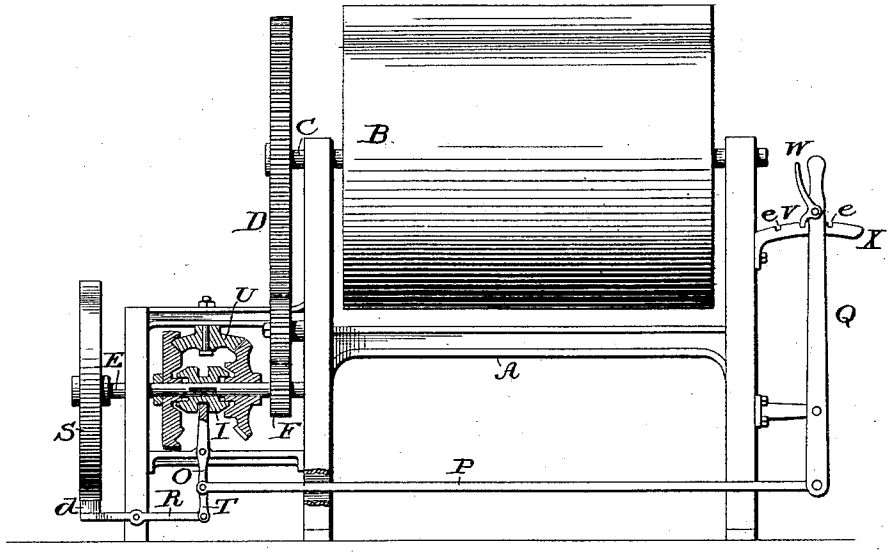


Fig. 4.

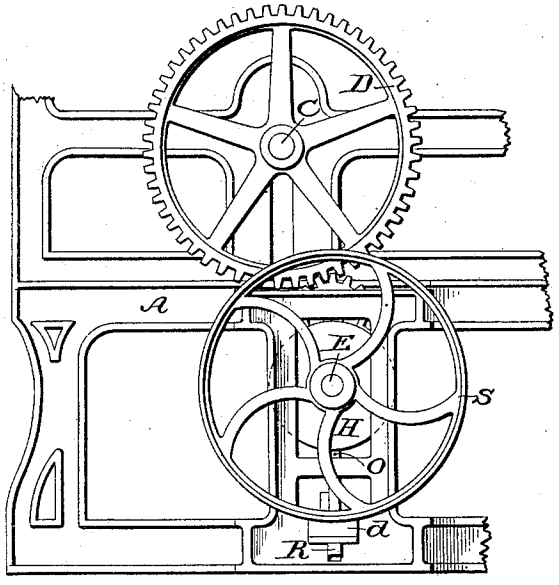
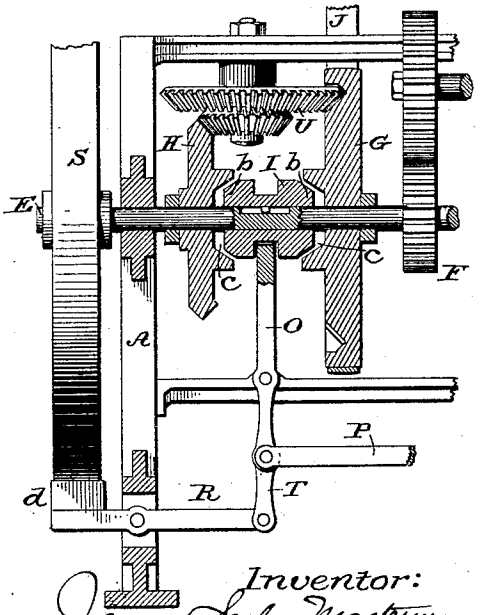


Fig. 5.



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Inventor:
James Seeley Masterman,
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his Attys.

UNITED STATES PATENT OFFICE.

JAMES SEELEY MASTERMAN, OF CHICAGO, ILLINOIS.

REVERSING MECHANISM FOR MACHINERY.

SPECIFICATION forming part of Letters Patent No 341,491, dated May 11, 1886.

Application filed October 28, 1885. Serial No. 181,188. (No model.)

To all whom it may concern:

Be it known that I, JAMES SEELEY MASTERMAN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Reversing Mechanism for Machinery, of which the following is a specification.

My invention relates to mechanism for reversing the motion of machinery; and it consists, mainly, in two wheels carried by the driving-shaft, and so connected with the line-shaft, with the motor, or with each other, as to be rotated always in opposite directions; a clutch adapted to engage with either of said wheels, or to be disconnected from both; a lever for moving the clutch, and a brake connected with the clutch, the lever, or both, in such manner as to arrest the motion of the machinery when the clutch is in an intermediate position and in engagement with neither wheel, but to be thrown out of action as the clutch engages with either wheel.

The details of the mechanism employed to carry out my invention are susceptible of considerable variation without departing at all from the spirit thereof, as will be seen from the following description, and by referring to the annexed drawings, in which—

Figure 1 is an end elevation of a printing-press with my improved mechanism applied, only the cylinder and frame of the press being represented, and the mechanism embraced within my invention being shown in section; Fig. 2, a vertical section on the line *x x* of Fig. 1; Fig. 3, a view similar to Fig. 1, but representing toothed gearing instead of belting; Fig. 4, a side elevation of Fig. 3; Fig. 5, a detail view of the gearing adapted to give two different speeds.

The object of my invention is to effect quick reversal of machinery without injury thereto.

In reversing machinery of any kind, and particularly such as is heavy or runs at high speed, and consequently involves considerable inertia or momentum, it is difficult to make the reversal quickly, and there is always a liability of destroying the clutch or coupling and of straining the machinery. To overcome these difficulties I combine with the reversing mechanism a brake or retarding device which acts upon the moving machinery, and arrests or tends to arrest its motion during the time in which the reversal is effected.

In the drawings, A indicates the frame, and B the cylinder, of a printing-press, the latter mounted upon a shaft, C, which carries at one end a gear-wheel, D.

E indicates a driving shaft carrying a pinion, F, which, either directly or through any suitable intermediate gearing, gives motion to gear-wheel D, and thus to the cylinder B. Instead of a printing-press other machinery may be thus driven either with or without the interposed gearing.

G and H indicate two wheels, which are loose and free to turn upon and independently of the shaft E, though held against movement lengthwise thereof. Motion is imparted to these wheels in any convenient manner, but in reverse directions, and an intermediate clutch sleeve or collar, I, having ends formed to engage with the wheels G and H, and arranged to slide upon a spline or feather, *a*, of the shaft, serves to connect either wheel with the shaft when thrown into engagement with such wheel.

In practice I have found that belting forms the best means of transmitting motion to both the wheels G and H, though toothed gearing may be used for giving motion from one to the other, as will be explained farther on. When belting only is employed, it is arranged in the manner illustrated in Figs. 1 and 2—that is to say, the wheel G receives motion through a straight belt, J, from a band-wheel, K, on a counter-shaft, L, and the wheel H receives motion through a crossed belt, M, from a band-pulley, N, also on the shaft L. Both the wheel K and pulley N are of course keyed fast upon shaft L and turn therewith, the shaft receiving motion in any suitable manner and from any convenient source.

For the purpose of shifting the clutch sleeve or collar I, a shifting-lever, O, is pivoted to the frame-work or other support at such point as circumstances render expedient, its upper forked end working in a circumferential groove formed in the body of clutch-sleeve I, and its lower end connected by a rod or bar, P, to a hand-lever, Q, which is pivoted to the frame or other support, and serves to shift the lever O.

The construction of the clutch may vary, and any well-known or approved form may be adopted. It is, however, essential that a sufficient play or space be provided to enable the sleeve or collar to be moved to a point between wheels G and H, where it shall be clear of and disconnected from each, in order that said wheels may rotate freely without imparting motion to the shaft E.

In practice I prefer to employ a friction-clutch, instead of one having toothed or interlocking portions, because there is always great danger of breaking the teeth in connecting the interlocking portions, and because a friction-clutch permits a sufficient amount of slip before finally locking fast to allow the connection to be made, and the inert portions of the mechanism to be brought into action gradually, thus avoiding undue strain upon the parts. I therefore preferably adopt the form of clutch illustrated in Figs. 1, 3, and 5, consisting simply of the sleeve I, formed with tapering or conical ends *b*, to enter corresponding seats or sockets, *c*, formed in the inner faces of wheels G and H. The counter-shaft L and its pulleys being caused to revolve, motion is transmitted therefrom to the wheels G and H by the belts J and M, as mentioned. If, now, the hand-lever be moved to throw clutch-collar I into engagement with wheel G, the shaft E and the machinery driven therefrom will receive motion in one direction. If the lever be thrown in the opposite direction, the motion of the machinery will be reversed.

Referring now to Figs. 1 and 3, the brake or retarding device will be explained. This consists simply of a lever, R, pivoted to a suitable support, provided at its outer end with a brake-shoe, *d*, to bear against a fly-wheel or a brake-wheel, S, keyed fast upon the shaft E, and jointed or connected at its inner end to the lower end of shifting-lever O by a link, T. The pivots and joints of levers O and R, link T, and rod or bar P are so arranged that when the clutch-collar I is in its intermediate position they all fall in line, the lever O and link T constituting a toggle, which in straightening depresses the inner and raises the outer end of lever R, and thus forces the brake-shoe firmly against the wheel S. Thus when the clutch-collar is out of engagement with both wheels G and H the brake is applied; but as soon as the lever R is shifted in either direction, through the movement of hand-lever O and rod P, the toggle is bent and shortened, and consequently the brake-lever R and its shoe *d* are moved away from wheel S. In this way, it will be seen, I promptly arrest the motion whenever the driving-wheels and the driven machinery are disconnected, and in reversing the motion either way I first disconnect from one driving-wheel, then I arrest the motion of the machinery, and finally I establish connection with the other driving-wheel running in a reverse direction from the first.

As stated, belting is preferred to toothed gearing, and this because there is less noise, no backlash, and little or no jar and vibration caused by the belting, whereas all these objections exist to a greater or less degree with toothed gearing. Where, however, gearing is preferred or required for any reason, I arrange the same in the manner illustrated in Figs. 3 and 4 or 5, and thereby accomplish the same final result as by the belts. The wheels G and H, the clutch I, shaft E, and the shifting-lever and connections remain as above described, except that the wheels G and H are formed with bevel gear-teeth, and only the wheel H is adapted to carry a belt.

Instead of employing a counter-shaft with two pulleys and two belts to drive the wheels G and H in reverse directions, I connect said wheels by an intermediate gear-wheel, U, by which one is caused to rotate in a direction the reverse of that in which the other rotates.

It is sometimes desirable, and is, generally, in printing-presses, that the backward rotation be slower than the forward, and I provide for this difference under both the above arrangements. In the first by employing pulleys of different and suitable size upon the counter-shaft L, and in the second by making the intermediate gear-wheel, U, with two concentric circles of gear-teeth, one circle of smaller diameter than and below the other, and by making the wheel G of a diameter to mesh and work with the smaller circle of teeth of wheel U, as illustrated in Fig. 5. By varying the relative diameters of wheels M and H any desired difference of motion may be secured in running forward and backward.

For the purpose of holding the clutch and brake in proper position I provide the hand-lever Q with a locking-dog, V, controlled by a grip, W, and arranged to engage in any one of three notches, *e*, formed in a rack-bar, X, secured in proper relation to the hand-lever, as shown in Figs. 1 and 3. Any equivalent locking device may of course be adopted.

Having thus described my invention, what I claim is—

1. In a reversing mechanism for machinery, the combination of a driving-shaft, two wheels mounted and free to rotate upon said shaft and connected with the motor or line shaft, substantially in the manner described, whereby they are caused to rotate in reverse directions, and a clutch arranged to slide lengthwise of the wheel-shaft and adapted to be engaged with either or disengaged from both of said wheels, whereby it is adapted to lock either wheel to the shaft or to unlock both wheels therefrom.

2. A reversing mechanism for machinery, consisting of a driving-shaft provided with two loose wheels adapted and arranged to be driven in opposite directions through power from a motor or line shaft, a sliding clutch-sleeve mounted upon said driving-shaft between said wheels and adapted to engage with either, a shifting-lever connected with said clutch-

sleeve, a hand-lever connected with the shifting-lever and provided with a locking-dog, and a rack-bar notched to receive the dog, all substantially as described and shown.

3. In combination with a driving-shaft, loose wheels thereon, and an intermediate clutch for locking either wheel to said shaft, a brake connected with the clutch or its shifting-lever and arranged to act upon and retard or stop the mechanism when the clutch is out of engagement with both wheels.

4. The combination, substantially as set forth, of a driving-shaft carrying a fly or brake wheel, and two loose wheels adapted to be turned in opposite directions, a clutch between said loose wheels adapted to lock either one to the shaft at will, a shifting-lever for moving said clutch, a brake-lever carrying a shoe to bear against the fly or brake wheel, and a link connecting the shifting-lever and the brake-lever, the pivots and joints of the shifting-lever, the brake-lever and the link being so arranged as to approach a straight line as the clutch moves to a medial position between the loose wheels, whereby the brake-shoe is thrown against the fly or brake wheel when the clutch is moved out of engagement with the loose wheels, and is withdrawn therefrom as the clutch is brought into engagement with either of said wheels.

5. In a reversing mechanism for machinery, the combination of a driving-shaft, loose wheels upon said shaft receiving motion in reverse directions from the line shaft or motor and at different rates of speed, and a clutch mounted upon the driving-shaft and serving to lock either wheel at will to the driving-shaft, whereby the mechanism is adapted to drive the machinery at one rate when running forward and at a different rate when running backward.

6. The herein-described reversing mechanism, consisting of driving-shaft D, provided with loose wheels G and H, sliding clutch I, counter-shaft L, provided with belt-wheels K and N, straight belt J, connecting wheels K and G, and crossed belt M, connecting wheels N and H.

7. The herein-described reversing and brake mechanism consisting of shaft D, provided with brake or fly wheel S and loose wheels G H, clutch I, counter-shaft L, provided with belt-wheels K N, belts J M, shifting-lever O, brake-lever R, link T, connecting levers O and R, rod P, and hand-lever Q, all combined and arranged to operate substantially as described and shown.

JAMES SEELEY MASTERMAN.

Witnesses:
JOSEPH S. KENNARD, JR.,
WILLIAM T. BLAIR.