Sheet 1 - 2 Sheets

W. F. Goodwin.

Converting Power into Speed

No. 72842 Patented Dec. 31, 1867.

Fig: 1.

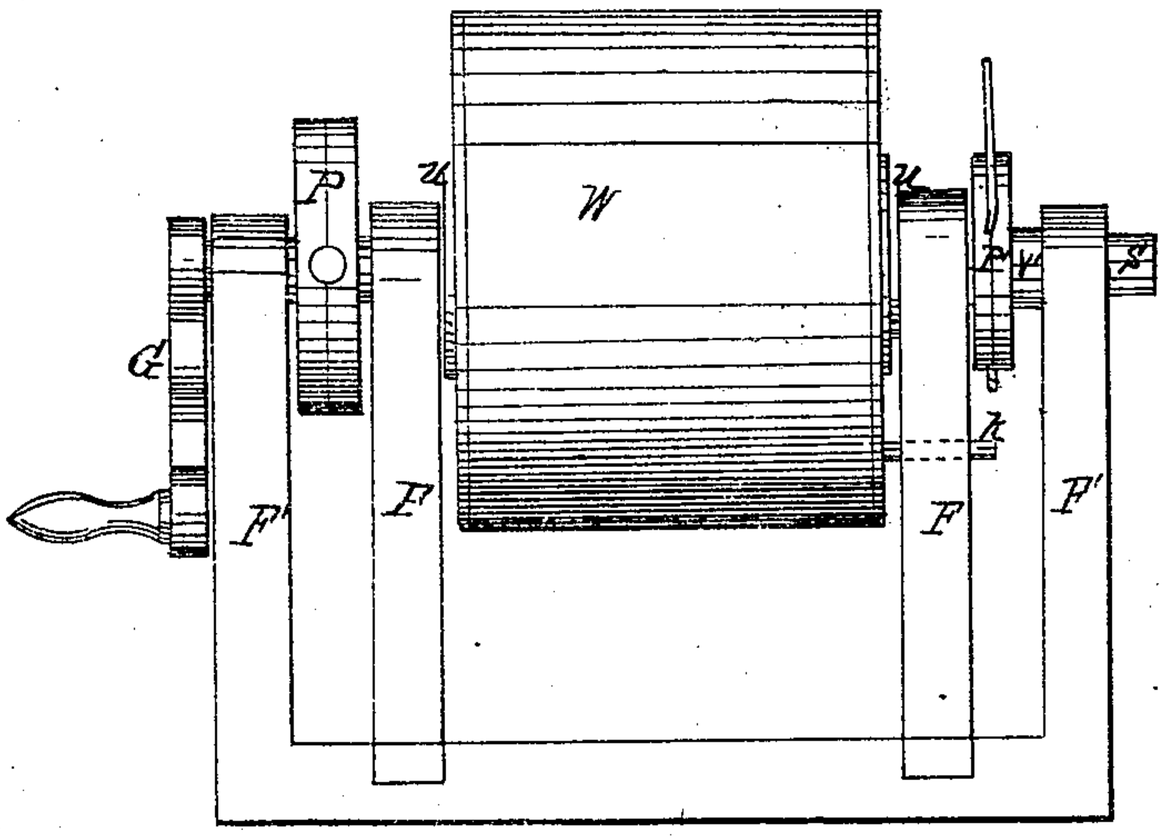


Fig: 6

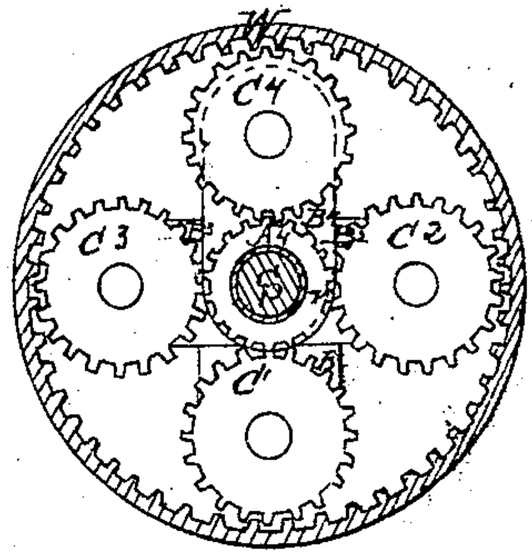
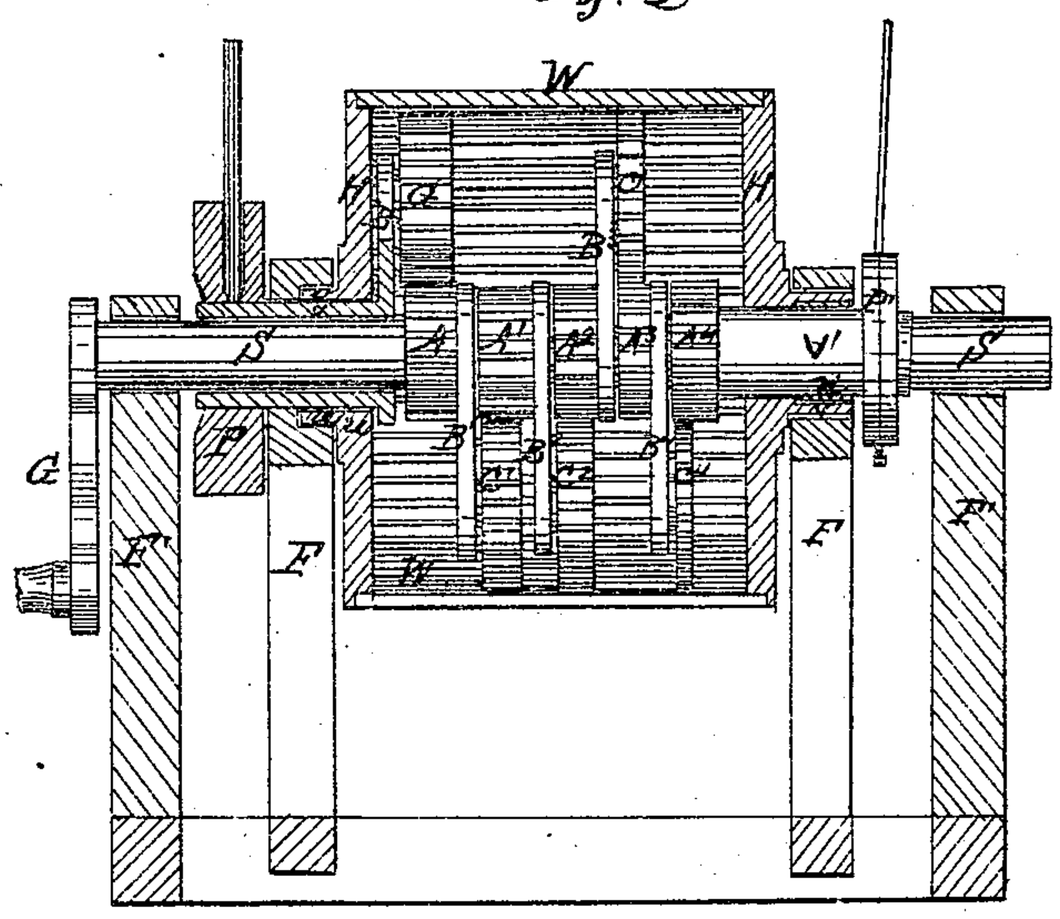


Fig: 2



Witnesses

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Moses Poster,

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Sheet 2 - 2 Sheets.

W. F. Goodwin.

Converting Power into Speed.

No. 72842 Patented Dec. 31, 1867.

Fig: 3.

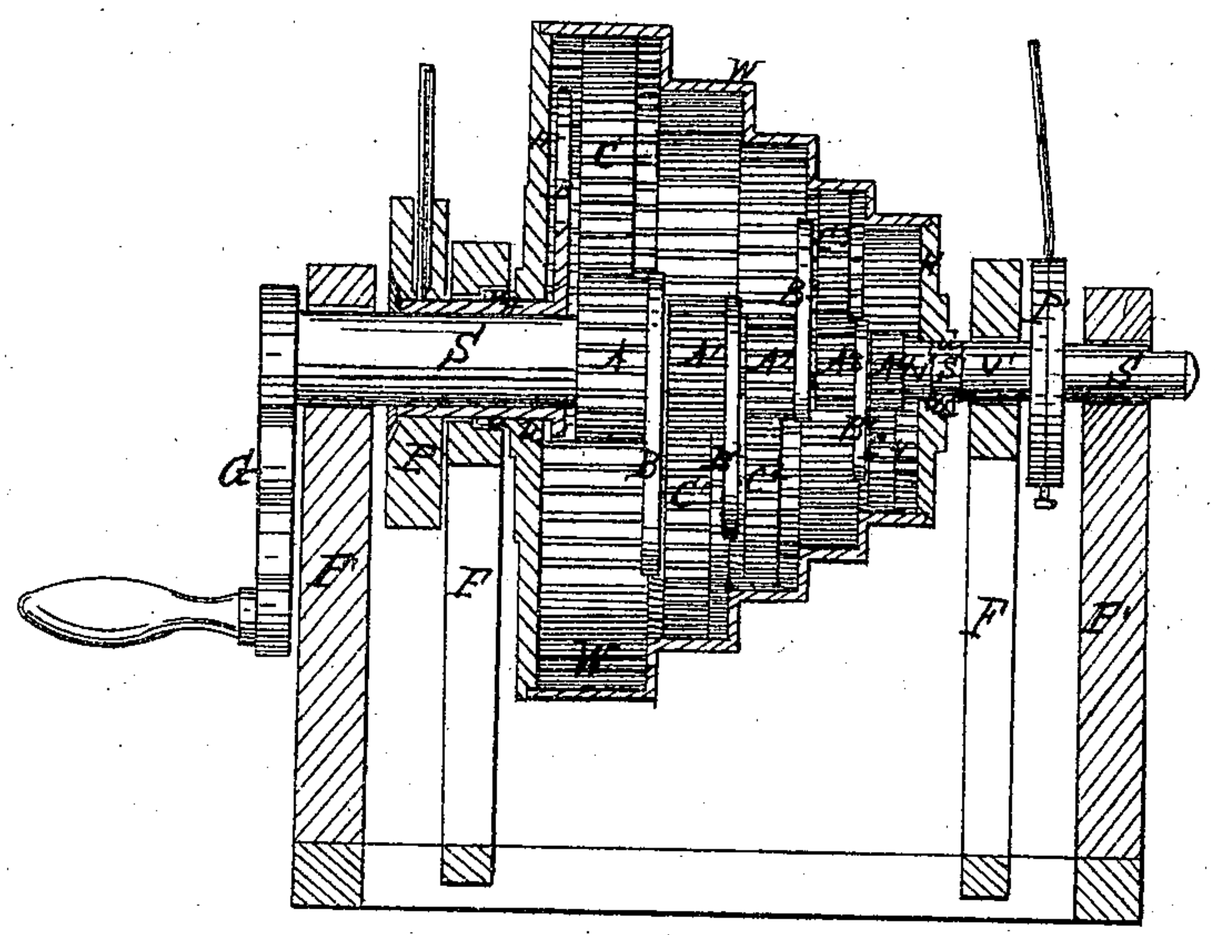


Fig: 4.

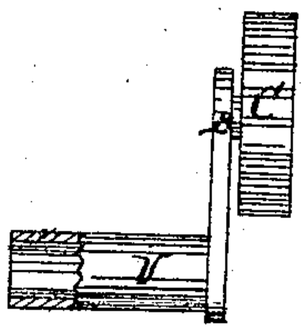
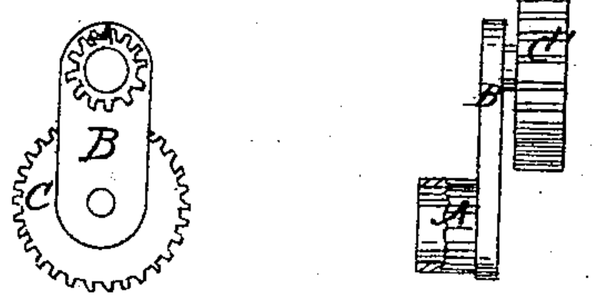


Fig: 5.



Witnesses
R. M. Eagle.
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UNITED STATES PATENT OFFICE

WILLIAM F. GOODWIN, OF EAST NEW YORK, N. Y.

IMPROVEMENT IN MECHANICAL MOVEMENT FOR CONVERTING POWER INTO SPEED.

Specification forming part of Letters Patent No. **72,842**, dated December 31, 1867.

To all whom it may concern:

Be it known that I, WILLIAM F. GOODWIN, of East New York, in the county of Kings and State of New York, have invented a certain new and useful Mechanical Movement for Converting Power into Speed and Speed into Power, and for multiplying and transmitting motion for all purposes where such movement can be applied and used; and I declare the following to be a full description of the same, reference being had to the accompanying drawings, which form part of this specification, and in which—

Figure 1 represents an outside view of a machine embodying my invention. Fig. 2 is a section through the drum or internal gear-wheel, W, in a direction parallel with its axis or shaft S, also through the journal-boxes and hollow sleeve V, showing the internal apparatus and manner of construction. Fig. 3 is a similar section through the conical internal gear-wheel, W, showing the wheels diminished in diameter and size. Fig. 4 is a detached view of the hollow sleeve V, with its arm B and intermediate transmitting-wheel C. Fig. 5 is a detached view of the pinion A, with its arm B′ and intermediate transmitting-wheel C^1; and Fig. 6 is a transverse section through drum W.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in the arrangement of a series of wheels within a wheel, all the wheels working on and around one shaft, S, in the following manner:

A series of pinions, A A^1 A^2 A^3 A^4, is mounted and have their journal-bearings on the shaft S, within the internal gear-wheel, W, each pinion having an arm attached to its end, which arm is rotated by and with the pinion to which it is attached. The outer or swinging ends of the arms are provided with studs D, which project on the opposite side from the pinion to which the arm is attached, and parallel with the shaft S.

On each of the studs D are mounted intermediate transmitting-wheels C C^1 C^2 C^3 C^4, which gear with the pinions on the shaft S, and with the internal gear of the wheel W. Commencing with the arm B and pinion A, each intermediate transmitting-wheel gears with the pinion of the next arm, and, being in gear with the wheel W, serves to transmit the motion from the pinions to the drum when the shaft is the driving-power, and from the drum to the pinions when the drum is the driving-power. The drum or internal gear-wheel, W, has hubs U on its ends, which have their journal-bearings in boxes X on the stand or frame F. The hubs U have holes through their centers, through which pass the shaft S and hollow sleeves V and V′. The ends of the shaft S have their bearings in the boxes X in the posts F′ F′. The hollow sleeves V and V′ have their bearings on and revolve around the shaft S.

By the arrangement of the apparatus herein described, and shown by drawings by which I have chosen to illustrate my invention, three distinct movements can be produced by the same machine, as follows:

First. The sleeve V, on which is mounted the arm B, is held from turning. The driving belt or power is applied to the drum W, which causes it to revolve around the shaft S. The intermediate transmitting-wheel C on the stud D of the arm B, being in gear with the drum or internal gear-wheel, W, and also with the pinion A on the shaft S, serves to transmit motion from the drum to the pinion. The drum or internal gear-wheel, W, having forty-eight (48) teeth, and the pinion having but twelve, (12,) four revolutions are given to the pinion A and its arm B to one of the drum W. The intermediate wheel C, being held in position by the arm B and stud D, does not revolve around the shaft, as do the other arms and intermediate wheels, but is revolved on the stud D, rolling in the same direction as the wheel W, causing the pinion A and its arm B′, which arm carries the intermediate wheel C^1, to revolve in a reverse direction to the wheel W, the pinion and arm making four revolutions around the shaft S to one of the wheel W. The drum and intermediate wheel, revolving in opposite directions, cause the intermediate wheel to mesh with the greater number of teeth in the wheel W, and make a greater number of revolutions than could be obtained if the drum and intermediate wheel did not revolve around the shaft and in opposite directions to each other. The intermediate wheel C^1, being in gear with the pinion A^1, causes the pinion A^1 to make 24 (twenty-four)

revolutions to one of the drum W, instead of 16, (sixteen,) which would be the number of revolutions of the pinion A^1 if the intermediate wheel C^1 did not revolve around the shaft, one-third of the whole number of revolutions made by the wheel A^1 being thus obtained without additional teeth or gear-wheels, or, in other words, with one-third less gearing than the same number of revolutions can be obtained by any other known arrangement. Thus, when the internal gear-wheel, W, has forty-eight teeth, and all the pinions on the shaft S have but twelve teeth each, the number of revolutions for each pinion to one revolution of the drum will be multiplied as follows: The first pinion, A, makes four revolutions to one of the drum W, while the second pinion, A^1, makes twenty-four revolutions to four of the pinion A and one of the drum W, and the third pinion, A^2, makes one hundred and twenty-four revolutions to twenty-four of the pinion A^1 and one of the drum W, and the pinion A^3 makes six hundred and twenty revolutions to one hundred and twenty-four of the pinion A^2 and one of the drum W, and the pinion A^4 makes 3100 (thirty-one hundred) revolutions to six hundred and twenty of the pinion A^3 and one of the drum W. As described and shown, it is evident that the number of revolutions will increase in the same ratio for every additional pinion, arm, and intermediate wheel added to the apparatus in the manner shown and described.

The above is a description of one of the movements performed and illustrated by the apparatus above described, which can be applied to clocks, watches, turning-lathes, &c., and to various other machinery where motion is required to be multiplied.

The second movement differs from the first as follows: The drum W is secured to the frame, and held from turning, while the driving belt or power is applied to the pulley P on the outer end of the hollow sleeve V. The arm B, being attached to the inner end of the sleeve V, revolves with it, carrying the intermediate transmitting-wheel C (which is mounted on the stud D on the arm B) around the shaft S within, and in gear with the internal gear-wheel, W, and also in gear with the pinion A on the shaft S. The intermediate wheel C causes the pinion A and its arm B′ and intermediate wheel C^1 to revolve around the shaft S in the same direction as the arm B and intermediate wheel C, the latter serving to throw the pinion A and intermediate wheel A^1 forward with greatly-increased speed, which increase of speed is effected by the first arm, B, and intermediate wheel C following after the others. Each pinion, arm, and intermediate wheel travels around the shaft in advance of those from which they receive their motion. Each, being followed by that from which it received its motion, receives increased velocity, and hence the greatly-increased speed without additional gearing. This movement has greater speed with the same apparatus, making twenty-five revolutions with the pinion A^1 to four revolutions of the pulley P and arm B, instead of twenty-four, as in the first-described movement. This difference is accounted for as follows: The arm B, revolving around the shaft instead of the drum, performs a smaller circle with its stud D than the inner surface of the drum W, thus requiring a less number of teeth of the drum W to produce one revolution of the pinion A^1. In this movement about nine and a half teeth of the drum W are used by the intermediate wheel C^1 to produce one revolution of the pinion A^1, while in the first movement (the drum revolving) the same intermediate wheel uses about ten teeth of the drum to produce one revolution of the pinion A^1. Thus, in twenty-five revolutions one revolution is gained with the same apparatus by simply changing its movement, and without additional machinery. This movement can be applied to the same uses as the first, and the difference of arrangement and movement adapts it to various uses where the revolving drum could not be used conveniently.

The third movement only differs from the first in the application of the driving-power. The belt or driving-power is applied to the pulley P′, which pulley is secured to the hollow sleeve V′. The hollow sleeve V is secured and held from turning, as described in the first movement, and the drum W is allowed to revolve, thus reversing the movement, converting speed into power, and making a most powerful hoisting apparatus. The driving-power may be applied to the pulley P′ or to the crank G, as desired. When applied to the crank G, the hollow sleeve V′ is secured to the shaft S. The shaft turns in the same direction as all the pinions which work on it, thus removing any objection which might be raised against this movement on account of friction. The journal-bearings of the drum W and hollow sleeve V do not rest on the shaft S. The shaft has its journal-bearings in the posts F′ F′, and serves as a journal for the pinions within the wheel W, and for the purpose above described.

The number of teeth and sizes of wheels may be varied, and also the number of wheels and arms may be increased or diminished as required for different purposes.

The advantages claimed for this arrangement of gear-wheels over all others are follows: All the gearing being arranged on one shaft and inclosed within the main wheel W dispenses with all counter-shafting, journal-boxes, beveled gears, and frame-supports usually employed in the ordinary way of gearing up to multiply and transmit motion, and a less number of wheels and teeth being required to produce the same number of revolutions, therefore dispensing with a great deal of friction and weight, thus gaining power as well as velocity over the ordinary gearing; in short, dispensing with the use of all extraneous and cumbersome machinery, placing the weight, little as it comparatively is, on and around one common shaft or axis, thus using less machin-

ery and encompassing the same in a smaller space than would be required for any other arrangement of machinery heretofore known producing the same number of revolutions. Millions of revolutions can be produced with but comparatively few wheels, and they occupy but an unusually small space. The arrangement of the apparatus of my invention is simple and strong, not liable to become disarranged or get out of order. It incases itself, and is thus kept clean. It can be oiled through a hole bored lengthwise in the shaft S, and through small holes bored in the side of the shaft, which emit oil to the bearing of each pinion.

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

1. The arrangement of a series of wheels within a wheel on and around one shaft or axle, whereby any desired number of revolutions can be produced, and any required power can be obtained for converting speed into power and power into speed for multiplying and transmitting motion, and for power-machines for hoisting and other purposes, substantially as described.

2. The arrangement of the hollow sleeves on the shaft S, and in the journal-boxes U and U′ on the frame F and posts F′, and the pulleys P and P′, constructed and operated in the manner and for the purposes substantially as described and shown.

WM. F. GOODWIN.

Witnesses:
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MOSES FOSTER.