

(No Model.)

3 Sheets—Sheet 1.

C. F. W. BÖDECKER.

DIFFERENTIAL MOTION TRANSMITTER.

No. 352,512.

Patented Nov. 16, 1886.

fig. 6.

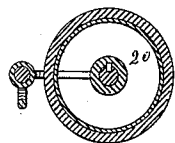


fig. 4.

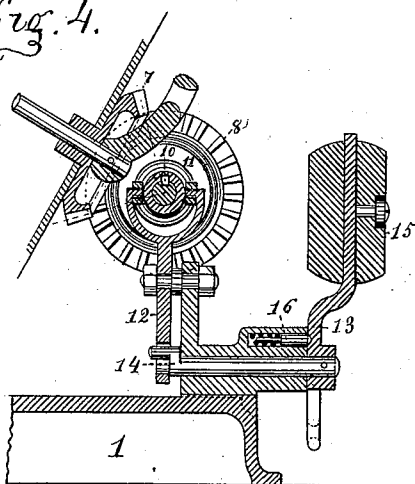


fig. 5.

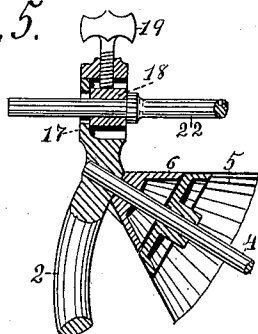
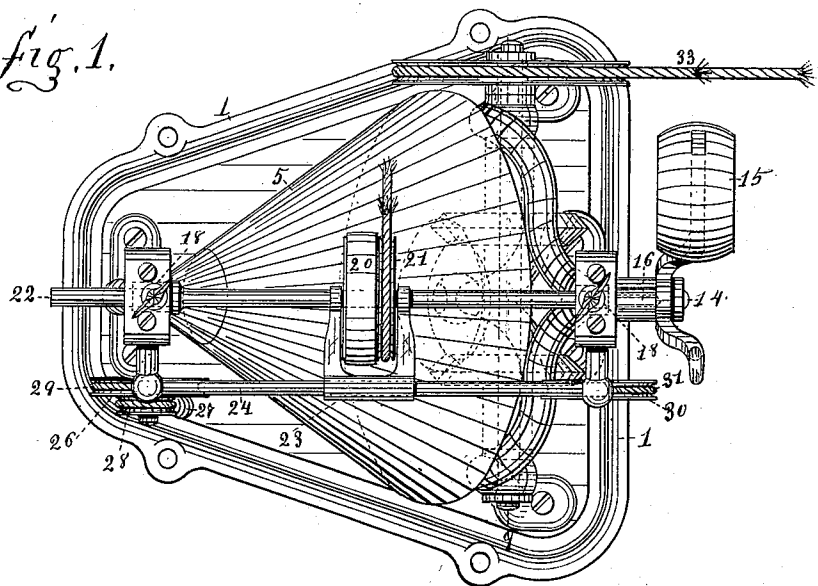


fig. 1.



WITNESSES.

Edmund A. Stange
A. J. Harris

INVENTOR

Dr. Carl F. W. Bödecker
By F. M. Taylor Atty

(No Model.)

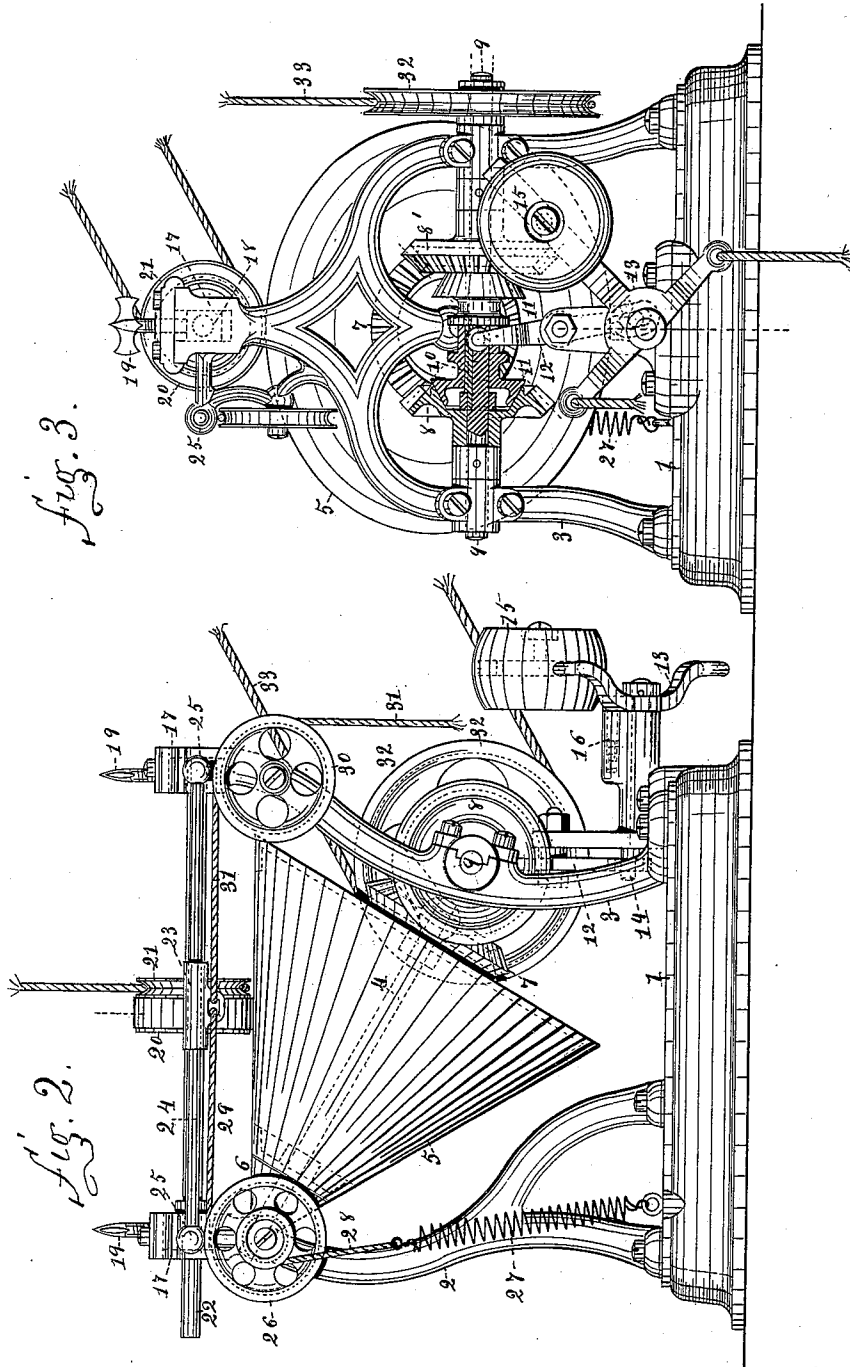
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Edmund A. Strause
A. G. Harris.

INVENTOR.

Dr. Carl F. W. Bödecker
By Fomer B. Taylor Atty

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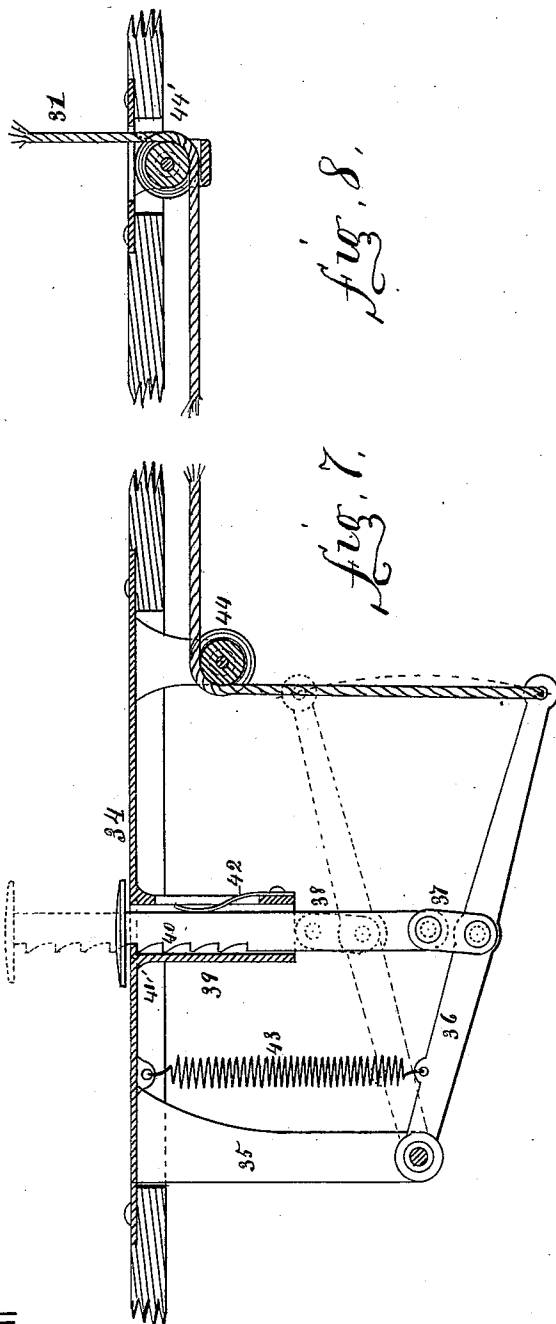
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WITNESSES

Edmund A. Frazer,
R. H. Parker.

INVENTOR

Dr. Carl F. W. Bödecker
By Kemmer, B. Taylor atty

UNITED STATES PATENT OFFICE.

CARL F. W. BÖDECKER, OF NEW YORK, N. Y.

DIFFERENTIAL MOTION-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 352,512, dated November 16, 1886.

Application filed May 4, 1886. Serial No. 201,091. (No model.)

To all whom it may concern:

Be it known that I, CARL F. W. BÖDECKER, a citizen of the United States, and a resident of the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Differential Motion-Transmitters, of which the following is a specification.

My invention relates to improvements in mechanical devices or machinery for the transmission of force or motion at different velocities; and the object of my invention is that, having a prime mover with a regular motion or a fixed number of revolutions per minute, a variable speed can be obtained and graduated in such a manner that there will be no fixed changes between the two extremes of motion, and that will be perfectly under the control of the operator. I obtain this result by the interposition between the prime mover and the machine or instrument to be driven of what I call a "reversible differential motion-transmitter," (placed on a stand or table in a position to be driven by the prime mover,) which is made in the following manner:

Upon a stationary bed are erected two uprights or standards having bearings, in which is secured a shaft in an inclined position, upon which is mounted a truncated conical-shaped drum which is free to turn on the shaft, and the form of the cone is completed by a section which is secured to the shaft, and, together with it, is stationary, for the purpose hereinafter described. This drum, together with the shaft, is preferably arranged so that its upper or driving side shall have a horizontal position.

At the large or lower end of the conical drum are arranged three miter-gears, one of which is attached to the drum, and the other two are mounted and free to turn on a driving-shaft which is supported in bearings at each end formed in the uprights. Between these two miter-wheels upon this shaft is placed a sleeve free to move lengthwise of the shaft, but which is made to revolve by means of a feather and spline in the sleeve and shaft. Upon each end of this sleeve is formed a friction-clutch, which engages alternately, as occasion may require, with the miter-wheels on either side, causing them to rotate, and with them the drum. By

a change of position of the clutch from one wheel to the other the direction of rotation is reversed, and when the clutch is placed centrally between the wheels and disengaged from both, the wheels, together with the drum, will be at rest.

In the upper ends of the uprights are formed bearings, adjustable by screws, carrying a horizontal shaft which is parallel with the upper surface of the conical drum. Upon this shaft is mounted a small drum, the external surface of which is covered with vulcanized rubber, and is free to be moved lengthwise of the shaft, and turns the shaft by means of a feather fixed in the drum working in a spline cut the length of the shaft.

Motion is communicated to the small drum and shaft from the conical drum by frictional contact, the necessary pressure being regulated by the adjustable bearings. The speed of the conical drum being regular, the motion transmitted to the small drum will be proportional to the diameters of the drums at any point in the length of the conical drum where they may be in contact, thus securing a graduated variable speed of the upper drum and shaft.

The position of the small drum with reference to the conical drum is regulated by means of a yoke mounted on a small guide-shaft supported by brackets formed on the side of the uprights and parallel with the shaft carrying the small drum. This yoke, together with the small drum, is moved in the direction of the small end of the conical drum by the tension of a coil-spring connected by a cord passing over a small pulley connected with a larger pulley, which is in turn connected by a cord to the yoke. By this means the small drum can be moved over the length of the conical drum by a small extension or contraction of the coil-spring. The small drum, when not in use or not required to revolve, is retained by the spring at the small end of the cone resting on the small stationary section before described, and at rest.

Attached to the above-described yoke is a cord to act in the opposite direction to that of the spring, passing horizontally to a direction-pulley, thence downward and attached to a treadle, (arranged in the floor,) hereinafter

described. By the depression of this treadle the tension of the spring is overcome, and the small drum is moved to any point on the conical drum which will give the required speed.

Motion is taken from the small drum by means of a round belt passing over a grooved pulley formed in connection with the drum, and is also taken from the end of the shaft driven by the small drum. The reversal of motion is accomplished by means of a clutch-lever pivoted at the center, which is actuated by a cam-shaft in connection with reversing-levers and balance-weight, the reversing-levers being connected by cords to treadles arranged alongside of the one above mentioned. These treadles are arranged in a group on the under side of an iron plate which is let into the floor, forming a level surface covering an opening through which they are introduced, and hinged at one end to studs extending downward from the plate. About midway of their length are attached by links vertical slides extending upward, supported by guides through the floor-plate, terminating in a flat head or button. On one side of these vertical slides are formed notches or detents, which engage with a projecting portion of the floor-plate, and are held in contact by a flat spring arranged at their back, and which allows of sufficient clearance to disengage the detents and permit the slides to move up and down in a vertical direction, and be held in any portion of their travel by allowing the detents to engage by the action of the spring at their back. The upward motion of these treadles is effected by means of spiral springs, and the downward by the pressure of the foot, by which their action is controlled. They may be placed under the motion-transmitter, in which position they can be connected direct to the transmitter, or in any place most convenient to the operator, by introducing bell-cranks or direction-pulleys, making connections under the floor, and when not in use the slides can be pressed down and secured by the detents, so as not to form obstructions in the room on the floor. By this arrangement the operator can at any time reverse the position of the clutches, and by it the direction of motion or rotation, and can change the speed or can stop the entire machine without interfering with the motion of the prime mover.

In order that my invention may be made more clear and better understood, reference is had to the accompanying drawings, in which—

Figure 1 represents a plan of the transmitter; Fig. 2, a side elevation; Fig. 3, an end view with one of the miter-wheels and a portion of the friction-clutch in section, showing their construction; and Figs. 4, 5, and 6 are views in detail of different portions of the machine. Fig. 7 is a vertical section showing the construction and arrangement of the treadle, and Fig. 8 a pulley to give direction to the transmission-cord.

Similar figures refer to similar parts in all of the views.

1 is the bed-plate; 2 and 3, the upright standards or frames; 4, the fixed shaft, (shown in dotted lines in Fig. 2 and the sectional view, Fig. 5.)

4 indicates the truncated conical-shaped drum, and 6 the stationary section of the drum attached to the shaft 4.

7 is the miter-wheel attached to the drum, and 8 and 8' the two miter-wheels which run loose on the driving-shaft 9. Into this shaft is secured the feather 10, which rotates the clutch 11.

12 is the clutch-lever which shifts the clutch; 13, the reversing-levers which actuate the clutch-lever through the agency of the cam on the end of the shaft 14 and the balance-weight 15.

16 is a spring-bolt catching into a recess in the arm supporting the balance-weight to hold it in a vertical position, and at the same time the friction-clutch clear of the miter-wheels.

17 indicates the heads with the adjustable bearings 18, and 19 the adjusting-screws.

20 is the small drum covered with vulcanized rubber, and 21 the grooved pulley from which motion is transmitted.

22 is the shaft driven by the drum 20, and 23 the yoke supported by the guide-shaft 24, which is held in position by the brackets 25.

26 is the double-grooved pulley, having different diameters, through which a differential motion is given between the spring 27 and the travel of the yoke 23 by the cords 28 and 29.

30 is a pulley giving direction to the cord 31, which forms a connection between the yoke 23 and the treadle described above, for changing the position of the small drum 20 to any desired point on the conical drum 5.

32 is the main driving-pulley giving motion to the transmitter by means of the round belt 33, leading to the prime mover.

34 is the floor-plate supporting the treadle mechanism; 35, the stud to which the treadle 36 is hinged.

37 are the links connecting the treadle to the vertical slide 38, which is held in position by the guide 39. The detents in the slide are shown at 40, which are held in contact with the catch 41, formed on the floor-plate, by the flat spring 42.

43 is the spiral spring, the tension of which forms the upward motion of the treadle.

44 and 44' are pulleys which give direction to the cord 31, which connects the treadle 36 to the yoke 23 of the transmitter.

The treadles which operate the reversing motion of the transmitter are made in precisely the same manner as the one above described, and, their operation being the same, are not shown in the drawings, the description of one sufficing for all.

I am aware that prior to my invention conical drums have been employed for transmitting a changeable motion, and that miter-gears, in

connection with clutches for the reversal of motion, have been in use and not new, none of which do I broadly claim; but

5 What I do claim as new and of my invention, and what I desire to secure by Letters Patent, is—

1. A differential motion-transmitter having a truncated conical drum, 5, in combination with the three miter-gears 7 and 8 and 8', and the friction-clutch 11, clutch-lever 12, reversing-levers 13, and cam-shaft 14, by means of which a reversible stop-motion is obtained, substantially as described, and for the purposes set forth:

15 2. A differential motion-transmitter having a truncated conical-shaped drum, in combination with the small drum 20, grooved pulley 21, shaft 22, with adjustable bearings 18, and stationary section 6 of the conical drum 5, where-
20 by a reversible stop-motion is transmitted from the conical drum to the small drum 20, substantially for the purposes specified.

3. A differential motion-transmitter having a small drum, 20, actuated by a conical drum, in
25 combination with the yoke 23, guide-shaft 24,

brackets 25, direction-pulleys 26 and 30, spiral spring 27, and cords 28, 29, and 31, the treadle 36, vertical slide 40, flat spring 42, spiral spring 43, and direction-pulleys 44 and 44', whereby the differential motion of the transmitter is
30 produced and regulated, substantially as described.

4. The combination, in an instrument or machine, of the mechanical devices by which a reversible differential stop-motion is obtained—
35 namely, a truncated conical-shaped drum, 5, miter-wheels 7, 8, and 8', friction-clutch 11, small drum 20, grooved pulley 21, shaft 22, with adjustable bearings 18, yoke 23, guide-shaft 24, pulleys 26 and 30, spring 27, and cords 28, 29, 40 and 31, the treadle 36, vertical slide 38, detents 40, and springs 42 and 43, all substantially as herein described, and for the purposes set forth.

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

C. F. W. BÖDECKER.

Witnesses:

M. BLOCH,
LEOPOLD NEPEL.