July 15, 1924. 1.501,679

D. MURRAY

PRINTING TELEGRAPH

Filed Oct. 20, 1920

Fig. 1.

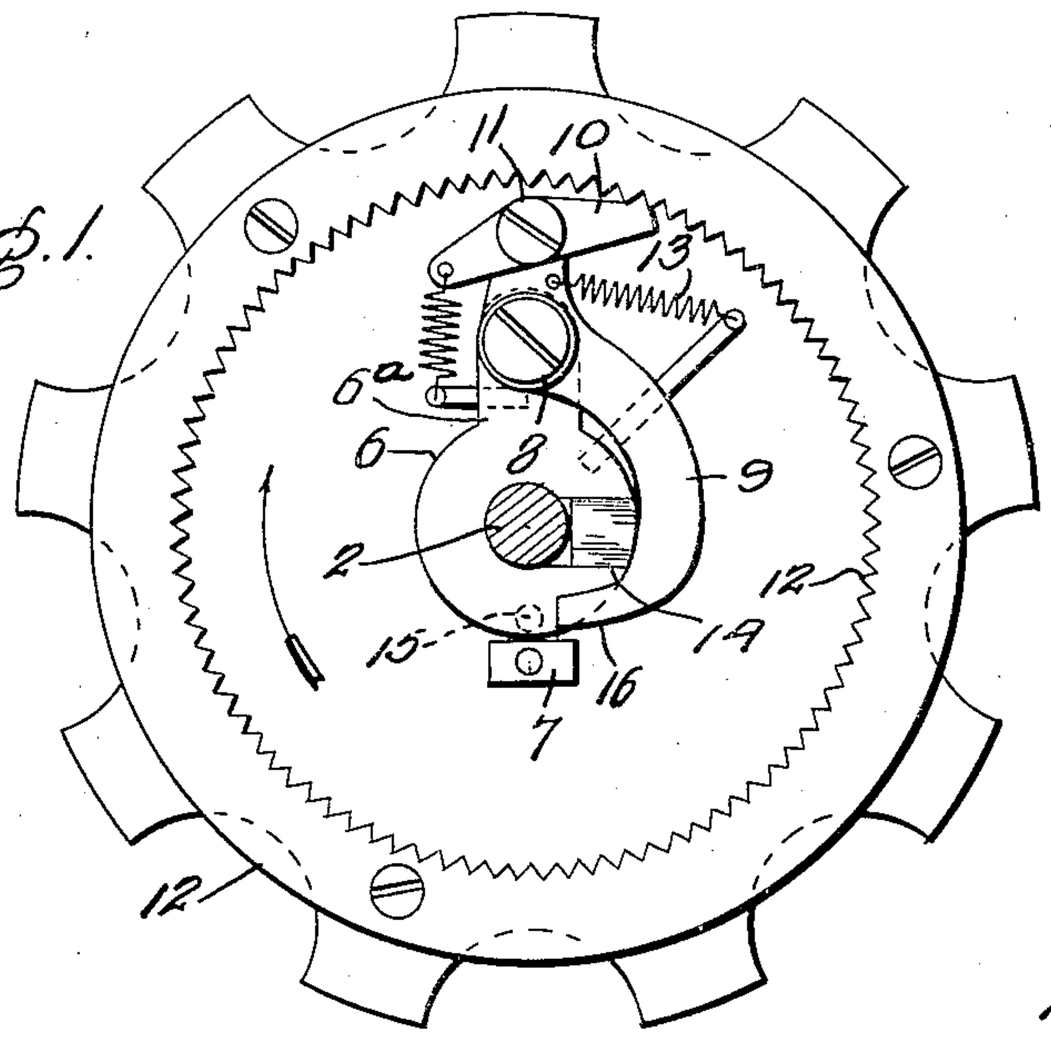


Fig. 3

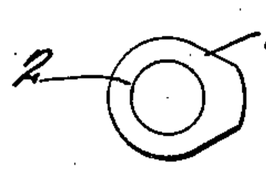


Fig. 4.

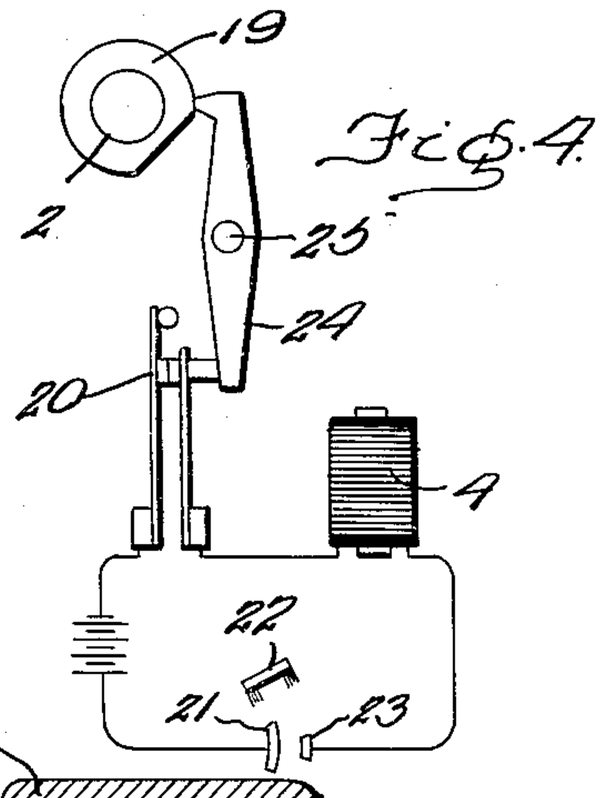
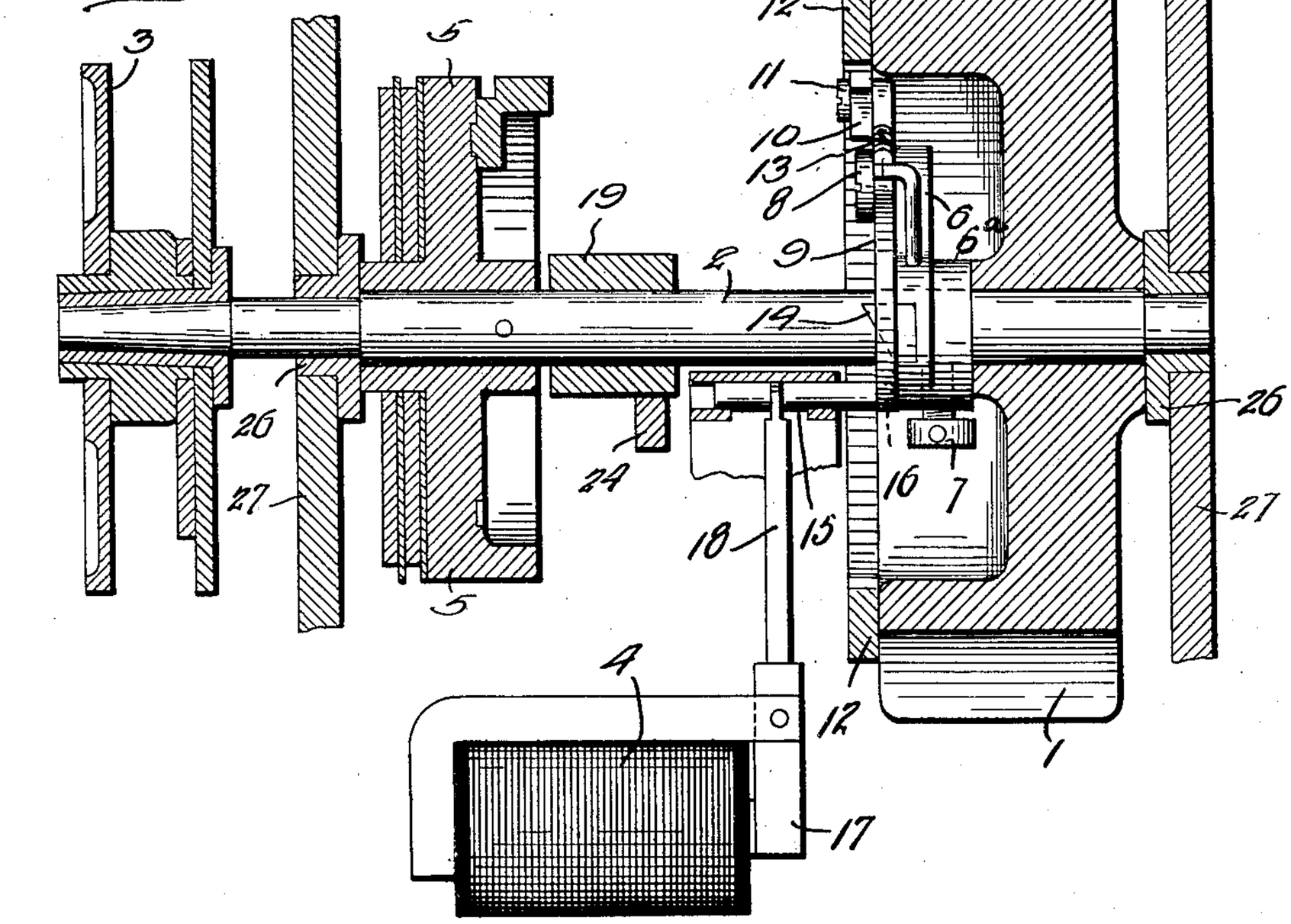


Fig. 2.



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UNITED STATES PATENT OFFICE.

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PRINTING TELEGRAPH.

Application filed October 20, 1920. Serial No. 418,248.

To all whom it may concern:

Be it known that I, DONALD MURRAY, a British subject, residing at London, in the county of London, England, have invented certain new and useful Improvements in Printing Telegraphs, of which the following is a specification.

This invention relates to printing telegraph apparatus of the type wherein the operating mechanism is driven by means of a continuously driven motor. The phonic motor is generally recognized as having the most uniform speed and therefore, best suited for this purpose; but in the case of telegraph printers like the Baudot there are difficulties in the way of applying the phonic motor drive in a satisfactory manner. It is the object of the invention described in this application to overcome these difficulties and secure a good phonic drive for the Baudot printer, the results being (*a*) simplification of the mechanism by omission of the centrifugal governor, friction brake governor and gear drive, (*b*) uniform speed and (*c*) speed easily changed to suit requirements. The invention is described as applied to the Baudot printer, an example of which is shown in U. S. Patent 388,244, but it is also applicable to any printer of the same general type as the Baudot, and it is likewise applicable to the Baudot or other telegraph distributor.

In the Baudot printing telegraph the printer has to be driven not only at the same speed as the distributor, but the typewheel mechanism of the printer must also preserve substantially the same phase as the brushes of the distributor. This is secured by a friction brake which slows down the motor until the typewheel mechanism has been brought into phase with the distributor brushes. It is not practicable to alter the speed of a phonic motor in this way, and this invention overcomes the difficulty by providing means for altering the phase relation between the typewheel mechanism and the phonic wheel, that is to say, altering the phase of the typewheel mechanism without altering the speed of the phonic motor.

The invention is illustrated in the accompanying drawings.

Fig. 1 is a front elevation of the phonic wheel with the phase correcting mechanism.

Fig. 2 is a sectional side elevation of a Baudot printer with the phonic motor and the phase correcting mechanism. Portions of the printer not bearing on the invention are omitted.

Fig. 3 shows an ordinary Baudot printer correcting cam.

Fig. 4 shows the modified form of cam preferably employed in this invention together with the electrical connections for the correction of phase.

The phonic wheel 1 is mounted on the same shaft 2, Fig. 2, as the typewheel 3 of the printer, the shaft revolving in bearings 26 in the frame plates 27 of the printer, and the phonic wheel being free to revolve on the shaft when uncoupled; but an adjustable coupling is provided between the shaft and the phonic motor under the control of a correcting magnet 4. This correcting magnet corresponds to the electrofrein (friction brake) magnet of the Baudot printer, and it is operated by the same electric impulse from the distributor. The magnets that drive the phonic wheel are omitted from the drawings, as they are not concerned in the present invention. If preferred, the phonic wheel may be attached outside of the frame plate 27 on the right, the shaft 2 being extended for this purpose, and the pin 15 then passing through the frame plate 27.

For the adjustable coupling, a slipping friction coupling suggests itself, but trial showed it to be unsatisfactory. It is unreliable and the shock of correction of phase between the heavy phonic wheel 1 and the heavy typewheel 3 and disc 5, is often sufficient to throw the phonic wheel out of step and so to stop it. I overcome this difficulty by using step by step correction by means of a ratchet or gearing. The correction is then positive, and the shock due to the change of velocity resulting from correction is much less severe. One form of this step by step correction that may be employed in this invention is the well known planetary correcting mechanism used in the Baudot distributor; but it is complicated and expensive to make, and I prefer a much simpler lever and ratchet step by step device shown in Figs. 1 and 2, which works well. It consists of a sleeve 6 with a projecting arm 6^a pinned or fastened by a set-screw 7 to the shaft 2 of the machine. Pivoted at 8 on the arm 6^a there is a sickle-shaped lever 9. The top end of this lever carries a pawl 10 pivoted at 11, adapted to engage with an internal tooth

ratchet wheel 12 screwed to the side of the phonic wheel. The spring 13 pulls the lever against the wedge-shaped piece 14, which serves as a stop for the lever. This definitely couples the phonic wheel to the spindle of the machine. At any required moment a small steel pin 15, shown in dotted outline in Fig. 1 and in side elevation in Fig. 2, may be pushed lengthways by the correcting magnet 4 attracting its armature 17 and throwing the rod 18, engaging the pin 15, to the right, thus thrusting the pin into the path of the free end 16 of the correcting lever 9 as it revolves with the shaft 2 and the phonic wheel 1. The result is that the pin 15 catches the free end 16 of the lever as it revolves and shifts it out so that the pawl 10 on the other end of the lever moves back over one tooth of the internal ratchet wheel 12. This alters the phase relation between the phonic wheel and the shaft carrying the typewheel to any convenient extent, say four degrees, depending on the number of teeth in the ratchet wheel 12, 90 being a convenient number. The small wedge-piece 14 fixed to the sleeve 6, as it revolves with the sleeve and shaft, throws the pin back to zero position when its work is completed. This ratchet correcting device has the advantage that there is a spring coupling 13, Fig. 1, between the phonic wheel and the spindle with its revolving masses. The spring reduces any shock when the correction suddenly alters the relative speeds of the phonic wheel and the spindle with its revolving parts 3 and 5.

The cam 19 on the printer shaft 2 Fig. 2, mechanically closes contact 20 Fig. 4, in the printer, once in each revolution of the shaft by means of the lever 24 pivoted at 25. This contact is in the same circuit as a contact 21—23 on the distributor. See Fig. 4. If the brush 22 of the distributor closes this contact by bridging 21 and 23 at the same time as the contact 20 in the printer is closed by the cam 19, then a correcting impulse flows through the printer correcting magnet 4, which then thrusts the pin 15 into the path of the tip 16 of the correcting lever 9, with resulting correction of phase to the extent of say about four degrees.

It is obvious that the same ratchet wheel, pawl, lever and interposing pin correcting device may be used in the case of a distributor driven by a phonic wheel motor, or other uniform speed motor, the requirement of slight successive alterations of phase between the phonic wheel and its spindle being the same in the case of the distributor as in the case of the printer. The only difference is that the phase corrections are much smaller, about one and a half degrees in the case of the distributor. The ratchet wheel has, therefore, to have about 240 teeth, and the motion of the correcting lever is therefore much smaller. By using two pawls on the lever, one shorter than the other by half a tooth, a ratchet wheel with 120 teeth may be used on distributors with phonic wheel or other uniform speed motor.

In order that the adjustable coupling method of phase correction may operate satisfactorily, it is necessary that the printer motor shall be adjusted to run either a trifle slower or faster than the brushes of the distributor. It is usual to run faster and to correct by slowing down, and as this arrangement is adopted in distributors which control the printers, it is necessary to adopt it also on the printers.

On a multiplex printing telegraph system, such as the Baudot, this condition of slightly greater speed is fulfilled at one station as B, where the correction of synchronism between the distributor at another station as A and the distributor at station B takes place, because the brush arms of the distributor at station B being continually retarded by the slight step by step correction of synchronism, this is equivalent to continual slight advances of the phase of the typewheel mechanism of the printers. That is to say the printers are virtually running slightly faster than the distributor at station B, although they are driven by the same vibrator. Hence the correction of the phase of the printers at station B can proceed satisfactorily.

At station A, however, from which the distributor synchronizing impulses are sent out, the speeds of the distributor and the printer phonic motors are and remain identical if they are driven by the same vibrator. Hence in this case to secure phase correction of the printers it is necessary either to have two separate vibrators at station A, one to drive the distributor motor and another to drive the printer motors slightly faster than the distributor motor, or the phase correcting contact in the printers must be arranged to open momentarily once per revolution instead of closing momentarily as it does in the ordinary Baudot printer. This may be effected by altering the shape of the contact cam 19 of the printers so as to open the contact momentarily instead of closing it momentarily. See Fig. 4. The result of this arrangement is that the printer phase-correcting contact is closed as long as the typewheel mechanism is not in phase with the distributor brush arms. Hence correcting impulses are received from the distributor and operate on the printer until the point is reached where the printer correcting contact opens at the same time as the distributor contact closes. Correction of phase in the printers then ceases, and the distributor and the printers remain in correct phase relation because the speed of the distributor and printers is identical, being driven by the

same vibrator. The new arrangement in which the printer correcting contact opens momentarily instead of closing momentarily, as in the ordinary Baudot printer, may be used at both station A and station B.

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. In a telegraph printer driven by a uniform speed motor, a cam and correcting contact mechanism carried by the driving shaft of the printer and so arranged that the cam holds the correcting contact normally in one position and alters it momentarily once per revolution.

2. The combination of a telegraph printer, a uniform speed motor, a correcting magnet controlling an interposing pin, and an adjustable coupling mechanism between the motor and the driving shaft of the printer, consisting of a lever and pawl and a toothed wheel, a wedge cam to restore the interposing pin to zero position, and a cam arranged to open or close intermittently a phase correcting contact.

In testimony whereof I affix my signature.

DONALD MURRAY.