

May 23, 1933.

A. F. BENNETT

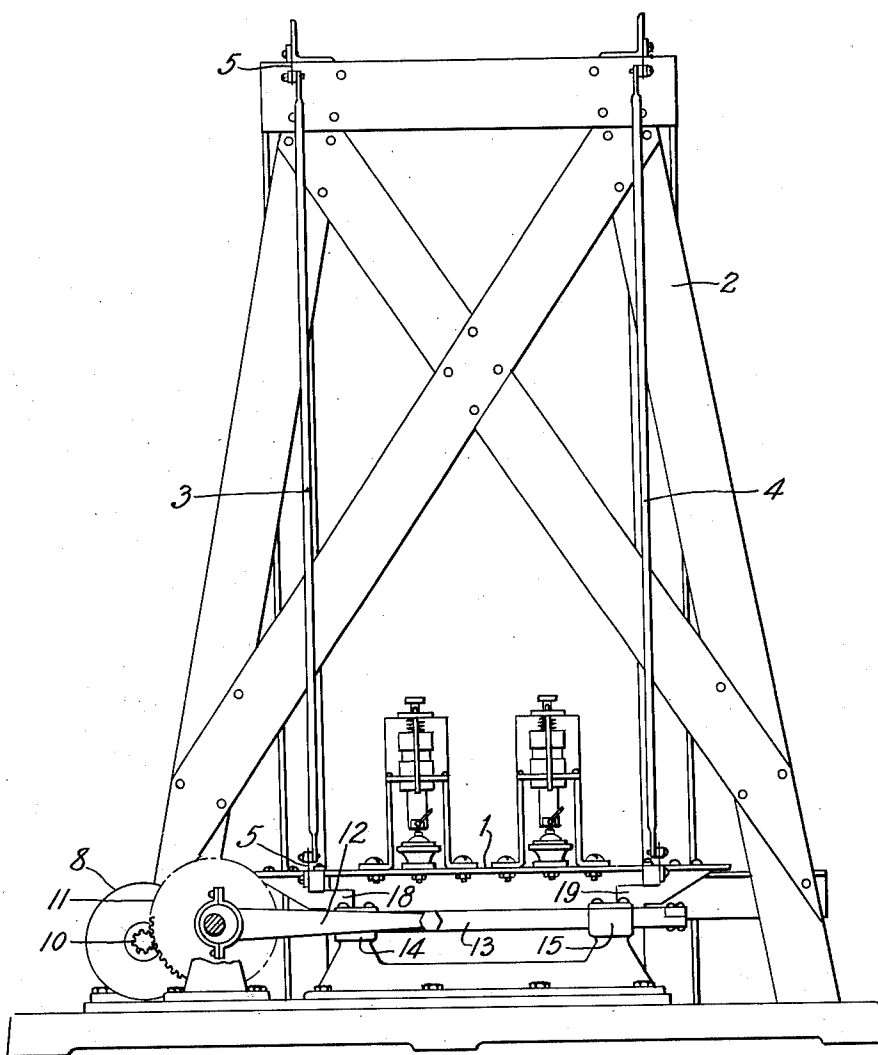
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TRANSMITTER FILLING MACHINE

Filed Dec. 13, 1929

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Fig. 1



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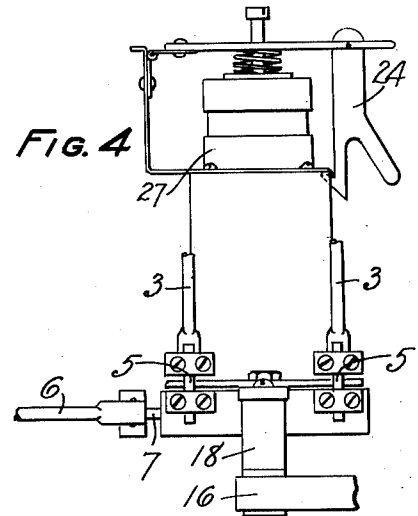
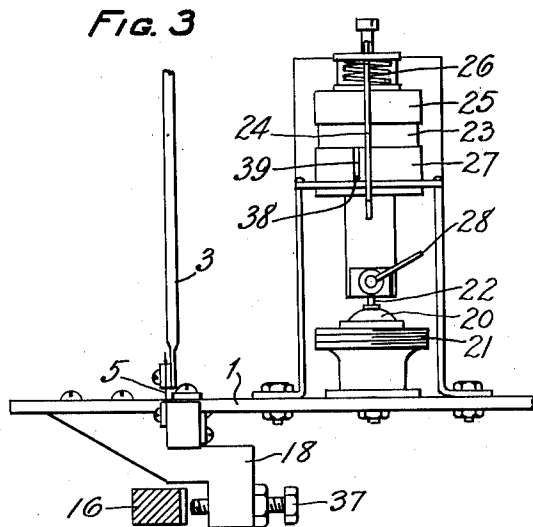
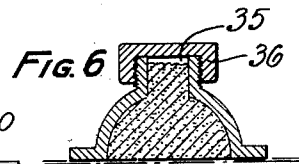
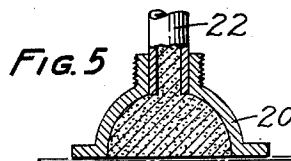
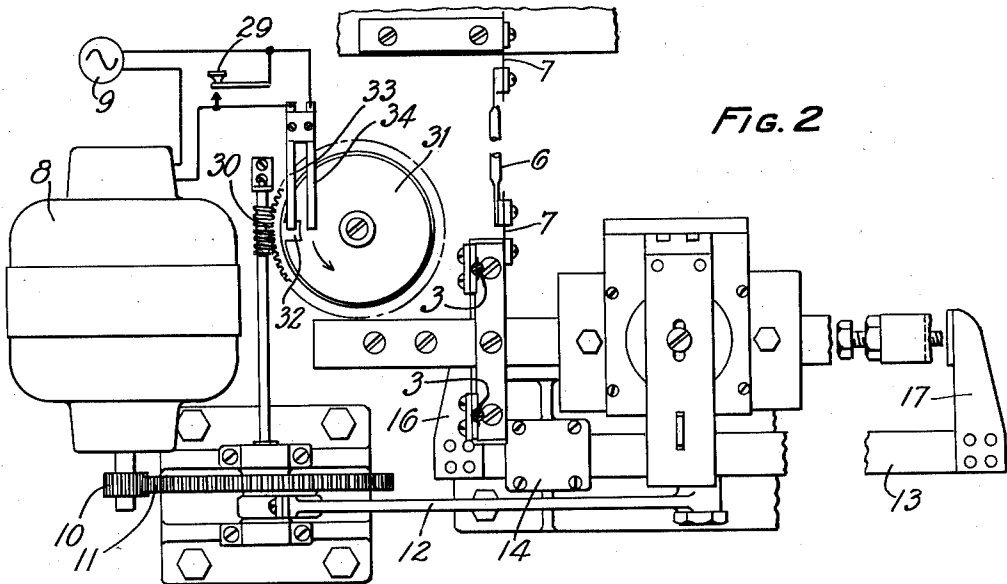
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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TRANSMITTER FILLING MACHINE

Application filed December 13, 1929. Serial No. 413,951.

This invention consists of a method of filling transmitter buttons and a particular machine by means of which this method may be satisfactorily carried out. It is the object of the invention to fill transmitter buttons in such a way that they will give more satisfactory and uniform performance under operating conditions.

reduced throughout the life of the transmitter. The filling must not be carried too far however, for if the carbon tends to become packed there may be a loss in the sensitivity of the transmitter.

All of these requirements are met according to the present invention by flowing the carbon into the chamber of the transmitter button for a definite time during which the button is vibrated and conditions are maintained for providing the necessary air space in the completed button.

A feature of the invention is a filling machine carrying out this method in which the transmitters are carried on a carriage with a filling nozzle inserted in each transmitter. The carriage is adapted to be given a sudden-reversing vibratory motion to settle the carbon so that the required degree of fullness may be obtained and the nozzle and the filling opening in the transmitter are so proportioned that a small and controllable air space is left when the nozzle is withdrawn.

A further feature of the invention is a suspension mounting for the carriage of the machine to prevent variations in filling due to frictional changes in the driven members.

The invention and particularly the filling machine and the manner in which it is used will be more clearly understood from a consideration of the following detailed description and the accompanying drawings in which Fig. 1 is an elevation of the transmitter filling machine; Fig. 2 is a partial plan view of the machine; Figs. 3 and 4 are sectional views of the filling mechanism taken as indicated in Fig. 2; and Figs. 5 and 6 are details of the transmitter button and filling nozzle.

Referring now particularly to Figs. 1 and 2, the carriage 1 is suspended as a pendulum from the steel framework 2 by means of rods or tubes 3, 3 and 4, 4 having short pieces of flat spring steel 5, 5 at each end to provide the necessary flexibility in the direction of the carriage motion. Similar rods 6, 6 and springs 7, 7 are provided in the horizontal plane to prevent the carriage from moving transversely to its proper direction

An improved transmitter button such as may be obtained in accordance with this invention is particularly desirable for applications where it will be subjected to severe mechanical and electrical treatment such as for instance, in a telephone handset. Heretofore it has been customary to carry out this filling operation by calculating the size of the chamber to be filled and pouring a quantity of loose carbon somewhat less than this calculated amount. Obviously a uniform degree of fullness cannot be obtained in this manner since the size of the irregular chamber cannot be determined with sufficient accuracy nor can the commercial variations in the size of the button parts be kept small enough to be neglected in the filling process. Such transmitters, therefore, may give satisfactory performance for a time but after a period tend to become noisy the resistance increases and signaling becomes difficult particularly over long loops. The deterioration of the carbon contacts is due principally, first to the abrasive action to which the granules are subjected when the transmitter is jarred and second to the abnormally high voltages applied to the contacts due to inductive voltages generated in the circuit being impressed upon the carbon which is of very high resistance at the instant of shock.

It has been found that by filling the button to a greater degree of fullness than is possible by ordinary methods the mean contact pressures are increased so that the resistance does not rise to such a high value when the transmitter is jarred so that the transient voltages developed will not be so large. In this way, also, the abrasive action in the carbon mass is reduced by restricting the freedom of movement of the granules and the normal resistance and the noise are

of motion. It will be readily appreciated that a structure of this kind will not be subject to frictional changes of the kind found in conventional designs involving the use of bearings or other sliding contacts. A motor 8 receives its power from a suitable source 9 and by means of the pinion 10, gear 11 and eccentrically mounted drive rod 12 imparts an oscillatory motion to member 13 which slides freely in bearings 14, 15. The member 13 carries at either end extension pieces 16, 17 projecting toward the carriage but having no permanent connection with it. On the lower side of the carriage there are downwardly extending brackets 18, 19, each having a set screw 37 adjusted to leave a gap of about $\frac{1}{16}$ inch between the end of the screw and the extension piece in each case. The motion of the member 13 is imparted to the carriage by this arrangement but due to the gaps, the carriage will be subjected to sudden reversals which, as already pointed out, will settle the carbon and permit a more complete and uniform filling.

When a transmitter button 20 is to be filled, it is placed in a suitable receptacle 21 beneath the filling nozzle 22 of the carbon supply chamber 23. The catch 24 in the position shown in Fig. 4 holds the cover 25 of the chamber securely in place due to the compression of spring 26. When the catch is released the chamber, which is keyed to the sleeve 27 by means of pin 38 and slot 39 to prevent its rotation, may readily be pushed upward in the sleeve to raise the nozzle while the transmitter is being put in place. When this has been done the catch is again locked so that the nozzle 22 projects into the button 20 a definite distance as determined by pin 38 contacting the bottom of slot 39. The valve 28 is then moved to the open position to permit the carbon to flow, and the motor is started by momentarily closing key 29. As the motor starts the worm gearing 30 turns the metal disc 31 so that the segment of insulation 32 moves out from under contact finger 33 and a circuit shunting the contacts of the key is completed by the disc bridging contact fingers 33 and 34. The motor, therefore, continues to run after key 29 is released and is stopped only when segment 32 again moves under finger 33. It has been found by experiment that a satisfactory filling may be obtained by continuing the filling operation for one minute and operating the motor at such a speed that the carriage moves through about 300 complete oscillations in this time. It will be understood, of course, that these values may be modified to suit the conditions of any particular case. Obviously, the filling time may be adjusted to any other value by choosing the proper ratio for the worm gearing.

When the filling operation is complete, the valve 28 is first closed. Catch 24 is then

released and the nozzle is withdrawn from the transmitter chamber, thereby causing the carbon in the nozzle to flow into the space vacated by the nozzle and leaving a predetermined void 35, as shown in Fig. 6. The chamber is then closed by cap 36 and is ready to be put in service.

While the invention has been described with reference to a particular machine, it will be understood that the machine may be modified in various ways within the scope of the invention. Moreover, the machine is but one feature of the invention for the filling operation could, in fact, be carried out by hand by tapping the button while the carbon is flowing into it, but it would be difficult and very laborious to obtain a sufficiently uniform filling by any such manual method. The invention, however, is intended to be limited only by the following claims.

What is claimed is:

1. In a transmitter button filling machine, a carriage holding transmitters to be filled, a source of supply of filling material for the transmitters carried by the carriage and including members engaging and partially filling the transmitter buttons, flexible spring means for supporting the entire weight of the carriage, an oscillating member at either end of the carriage normally out of contact therewith and means for driving the oscillating members whereby a quick reversing oscillatory motion is imparted to the carriage.
2. In a transmitter filling machine, a carriage carrying a transmitter having a chamber to be filled, a funnel containing filling material inserted in the chamber, the cross section of the part of the funnel so inserted bearing a definite relation to its bore, flexing members for supporting the carriage, an oscillating member at either end of the carriage normally out of contact therewith and means for driving the oscillating members for imparting to the carriage a quick reversing vibratory motion.
3. In a transmitter button filling machine, a carriage carrying a transmitter button to be filled, a supply chamber containing filling material and having a nozzle associated with the button, a reciprocating member having extensions spaced slightly out of contact with either end of the carriage, means for driving said member and means for automatically stopping the driving means after a predetermined time interval.
4. In a transmitter button filling machine, flat spring members, a carriage supported entirely by said members for holding the transmitter button and adapted for lateral movement by flexing the spring members, and driving means normally out of contact with the carriage for imparting to the carriage a quick reversing oscillatory motion.
5. In a transmitter filling machine the

combination of a transmitter carriage, laterally flexible springs carrying the entire weight of the carriage, driving means for the carriage, including a reciprocating member at either end of the carriage normally out of contact therewith and a timing mechanism comprising a driven member and contacts cooperating therewith for automatically stopping the driving means.

6. In a transmitter button filling machine flat spring members, a carriage supported entirely by said members for holding the transmitter button and adapted for lateral movement by flexing the spring members, and a member oscillating the carriage by impacts alternately applied in either direction to cause sudden reversals of its direction of motion, a motor driving the impacting member, a timing disc driven by the motor and contacts associated with the disc for stopping the motor at the end of a predetermined time.

In witness whereof, I hereunto subscribe my name this 9th day of December, 1929.

ARTHUR F. BENNETT.