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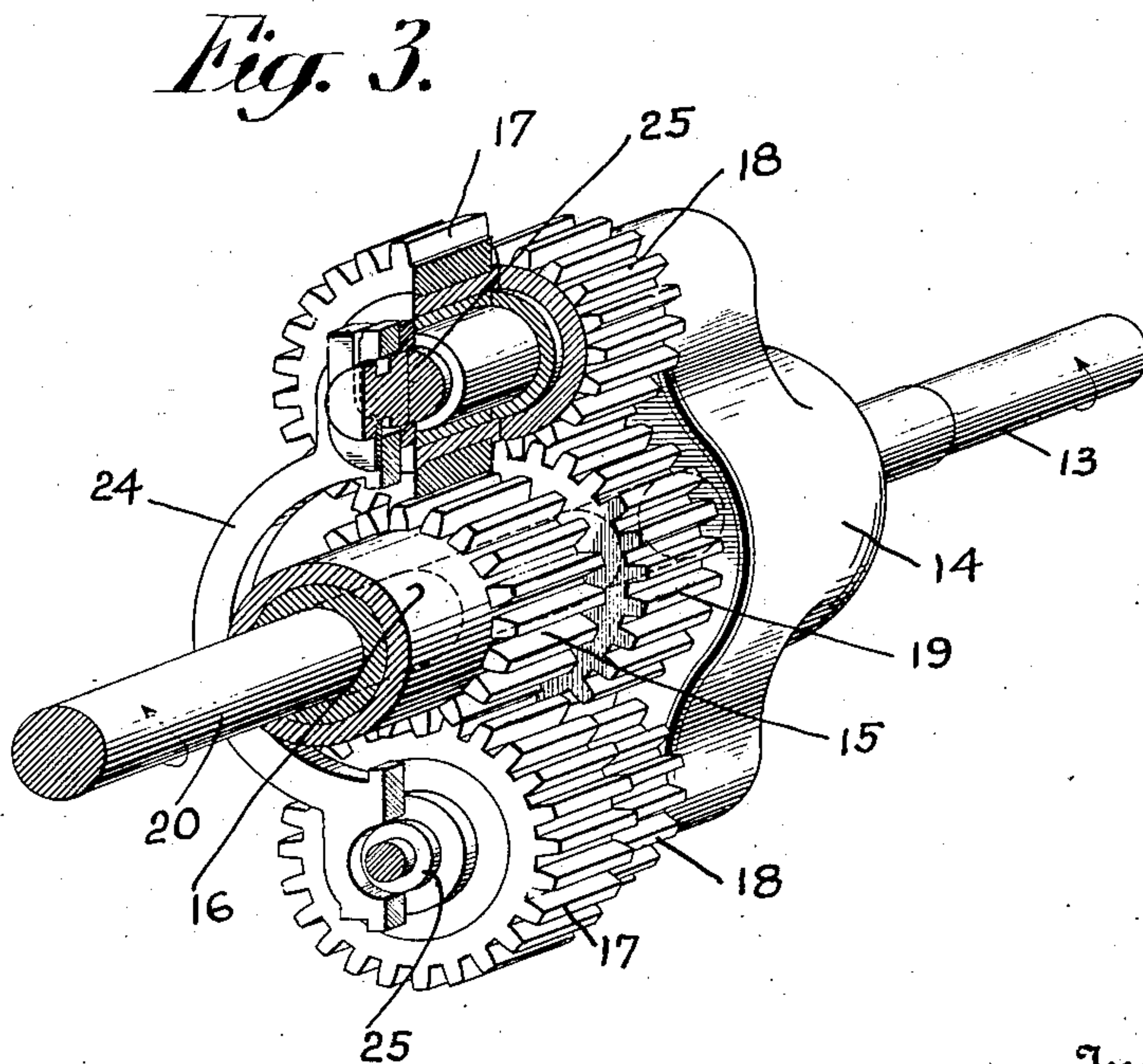
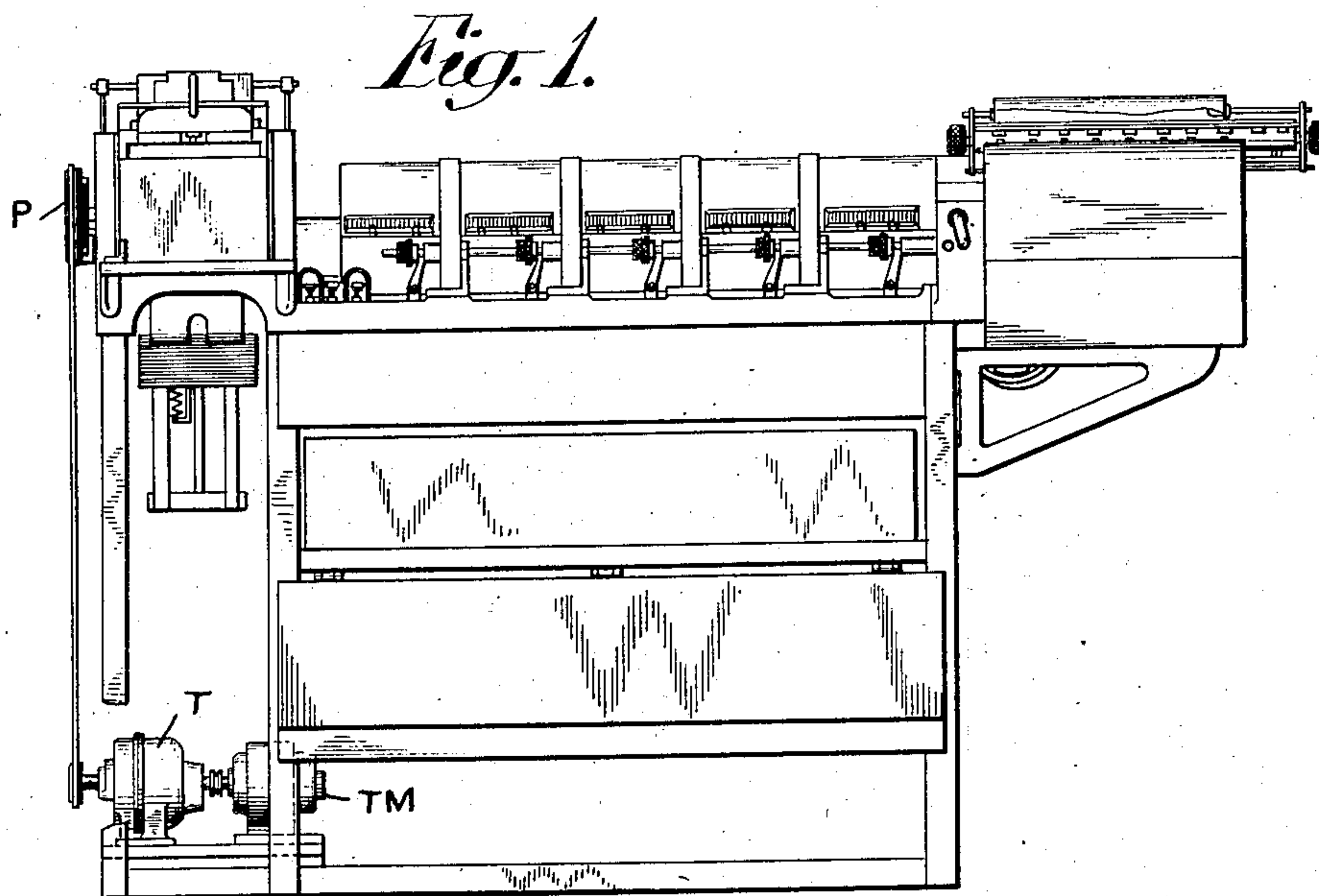
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AUTOMATIC SPEED CHANGING DEVICE FOR TABULATING MACHINES

Filed June 23, 1925

4 Sheets-Sheet 1



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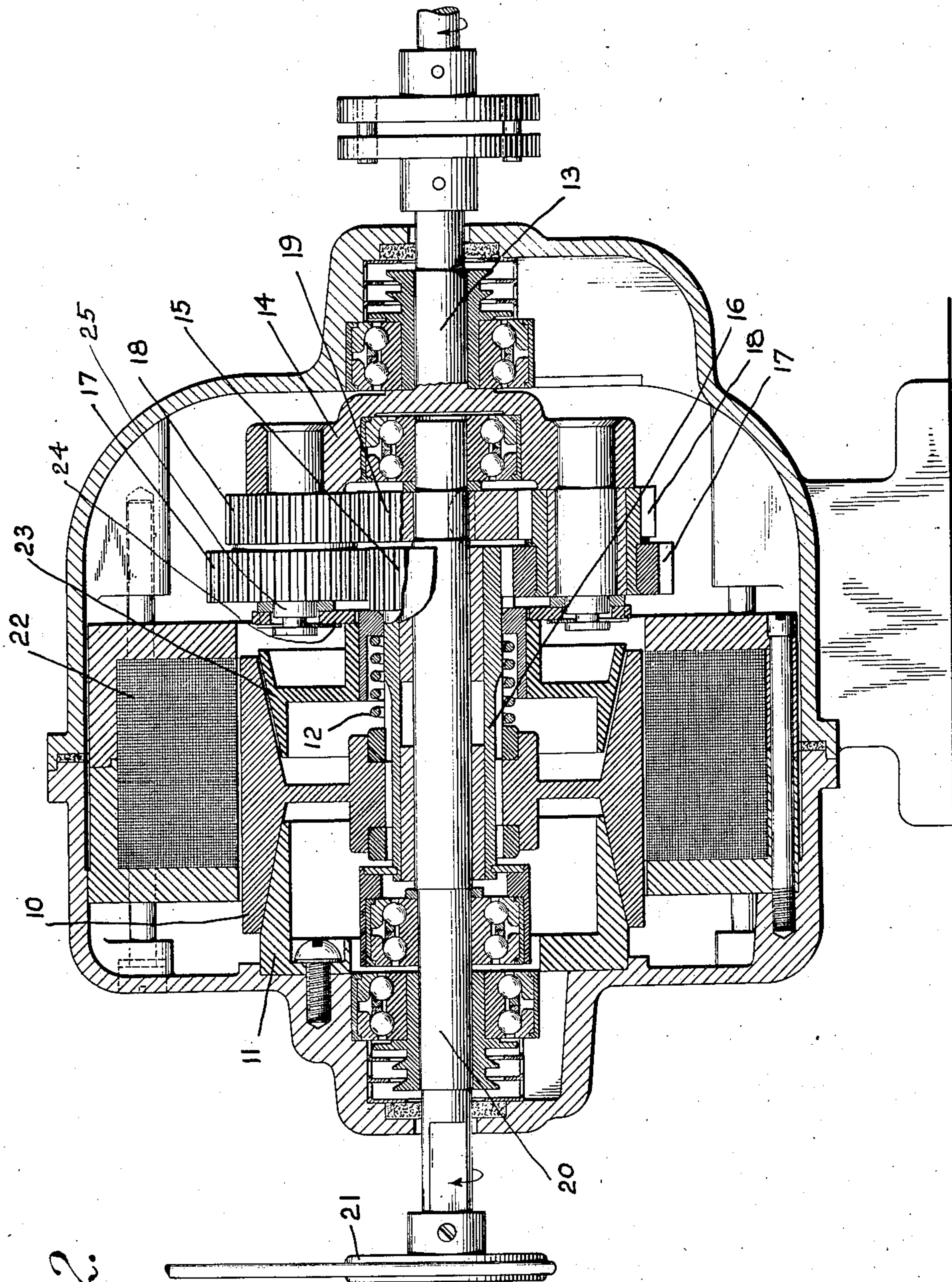


Fig. 2.

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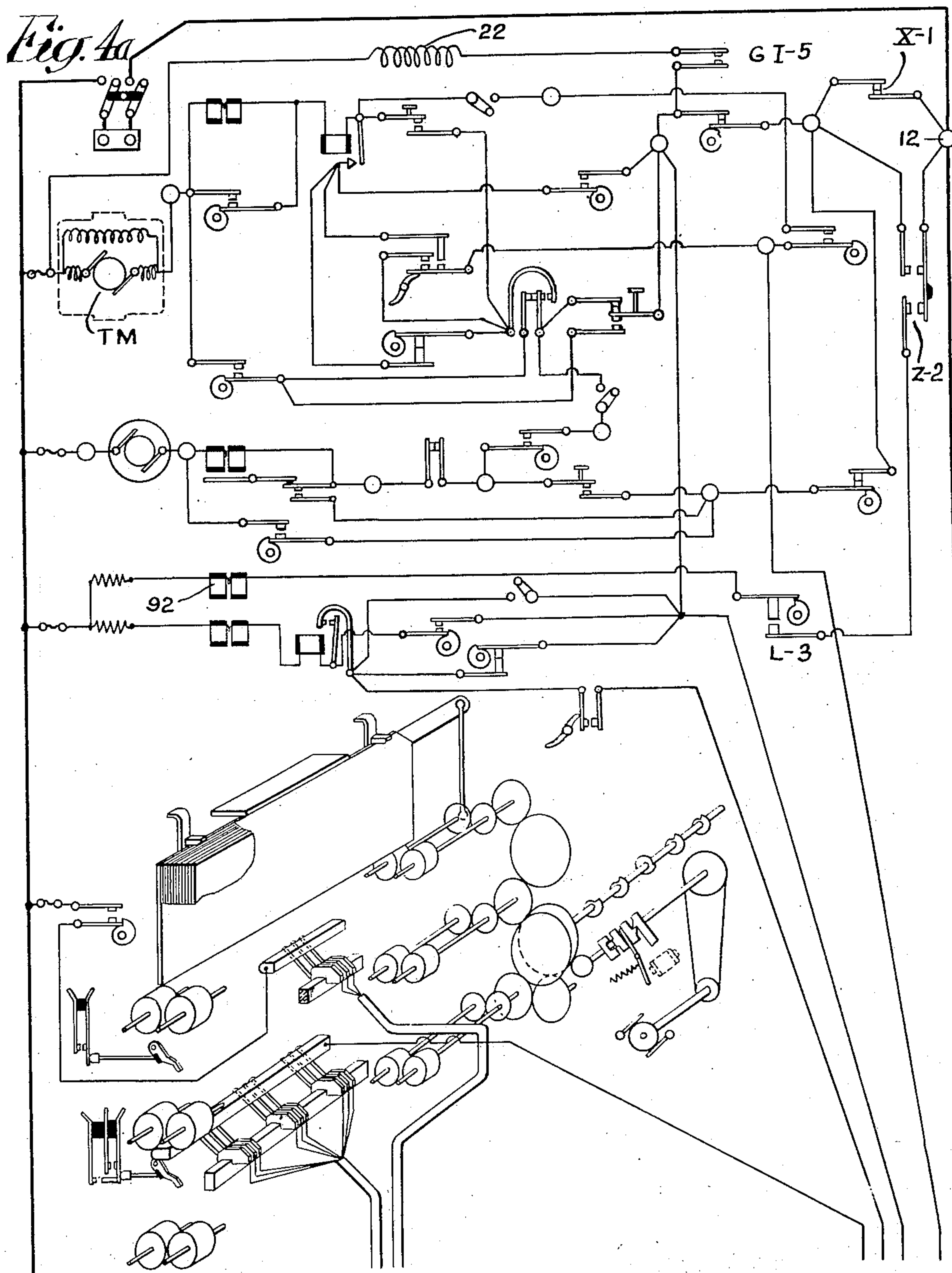
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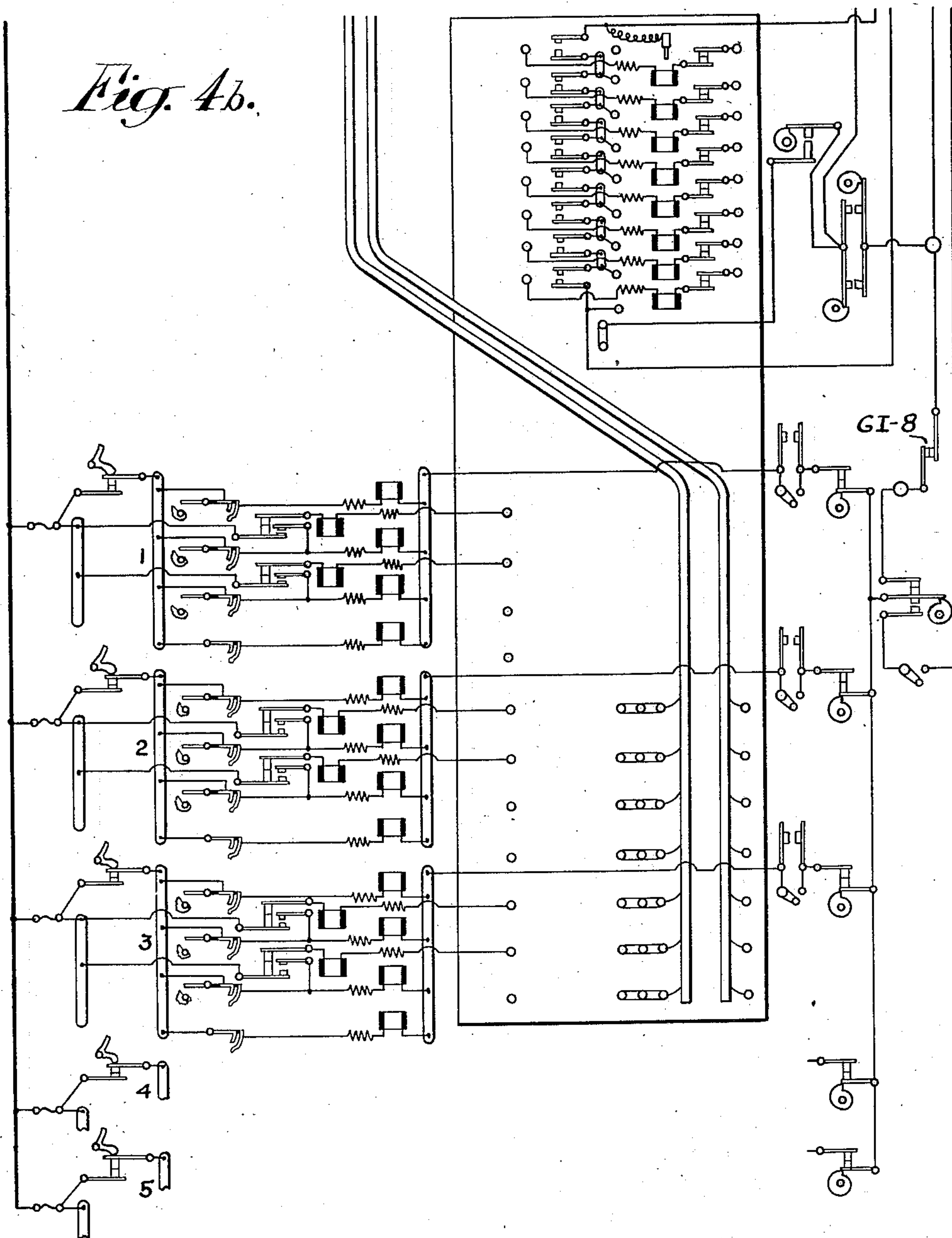
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4 Sheets-Sheet 4

Fig. 4b.



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UNITED STATES PATENT OFFICE

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AUTOMATIC SPEED-CHANGING DEVICE FOR TABULATING MACHINES

Application filed June 23, 1925. Serial No. 38,977.

This invention relates to improvements in tabulating machines and more particularly relates to the driving means for these machines.

5 In certain tabulating machines now on the market provision is made for driving the tabulator at a comparatively low speed for listing items and at a higher speed when the machine prints total entries and does not list individual items. In certain of these machines 10 transmission devices are provided which are manually shiftable to effect a drive at one speed or another. The transmission shift devices are usually interlocked with the list-non-list lever of the tabulator to compel the 15 proper setting of the transmission in accordance with the setting of the list-non-list lever.

Other machines require that the first card 20 cycle when the machine is set for tabulating be performed at a relatively slow speed and subsequently the remaining card cycles are effected at the usual high tabulating speed. Some machines of this type secure these re- 25 sults by means of two speed motors which may be used either in connection with or without a speed changing transmission.

According to the present invention a transmission of special type is provided intermediate the driving motor and the tabulator and provision is made for automatically controlling this transmission to secure higher or lower driving speeds according to the driving speed requirements of the tabulator. Control of the speed changing transmission is 30 secured by control devices on the tabulating machine. Provision is made for automatically controlling the transmission to secure high speed or low speed drive thereby according to whether the tabulator is tabulating or 40 listing and provision is also made for automatically running the tabulator at low speed for the first card cycle when the machine is set for tabulating and for subsequently changing the transmission automatically to drive 45 the tabulator for the subsequent card cycles at the higher and normal tabulating speeds. Furthermore these results are secured by means of a single speed motor. All changes 50 of driving speed of the tabulator are secured

by means of the transmission and suitable devices are employed in the tabulator for controlling the transmission. Manual shifting of the transmission is rendered unnecessary since the transmission is automatic in action. 55

In the drawings,

Fig. 1 shows a front view of a tabulator equipped with my improvement.

Fig. 2 is a detail sectional view of the automatic speed changing transmission. 60

Fig. 3 is a perspective view of certain parts of the transmission.

Figs. 4^a and 4^b taken together represent the circuit diagram of a tabulator incorporating the present improvements. 65

In more detail in the drawings, in Fig. 1 and in the circuit diagram, the tabulator motor is represented by the usual conventional symbol TM. The transmission is generally designated by T, and P is the pulley of the 70 tabulator.

Referring to Fig. 2, the transmission includes a drive shaft 13 driven by the motor TM in any suitable manner. 20 is the driven shaft of the transmission carrying a suitable 75 pulley 21 receiving the belt which cooperates with the tabulator pulley P. The transmission broadly may be said to be of the differential planetary type. Control of speed changes in the transmission is obtained according to whether or not a magnet winding 22 is energized or not. This magnet when energized is adapted to draw an armature or shoe member 10 to the right from the position shown. Fig. 2 shows the parts with the 85 magnet 22 deenergized and with the parts of the transmission in proper position for driving the tabulator at relatively low speed. With 22 deenergized the shoe member 10 is held in the position to the left as shown in 90 cooperation with the brake or clutch member 11 which is fixed against rotation by being fastened to the casing of the transmission. The parts are held in this position by means of spring 12. The drive from shaft 13 to 20 95 now is as follows: Shaft 13 rotates rotating with it a spider 14. A gear 15 which is integral with a sleeve 16 is held stationary and against rotation inasmuch as the sleeve 16 is keyed to the armature member 10 which at 100

this time is stationary. With gear 15 stationary, drive is secured through gears 17—18, to a gear 19 fast on the end of shaft 20. It will be understood that gears 17 and 18 are of different diameter and rotate around with the spider 14. In this way the driving pulley 21 is rotated at low speed.

For high speed drive, armature 10 is drawn to the right by the energization of magnet 22 and when in this position is held against a brake shoe or clutch member 23. This brake shoe or clutch member 23 is suitably slotted to receive a member 24 which is fitted to the pins 25 carried by spider 14. When 10 is to the right and in cooperation with clutch shoe 23 gear 15, sleeve 16, armature member 10, member 23 and pins 25 are all united together with the result that direct drive is secured from 13 to 20 driving 20 and pulley 21 at high or direct speed. The various details of supporting bearings, thrust bearings, etc., for receiving the driving strains and thrusts require no further description. It will be understood that low speed drive of the tabulator will occur at all times when magnet 22 is deenergized and high speed driving conditions will be automatically secured upon the energization of this magnet 22.

Referring now to the circuit diagram only such parts of this circuit diagram will be described as pertain to the present invention. The tabulator includes the usual group indicator magnet 92, which group indicator magnet controls group indicator contacts. One of these group indicator contacts designated GI—5 is serially disposed in a line including the transmission controlling magnet 22. Other contacts controlled by the group indicator magnet are those designated GI—8. These contacts are so controlled by the group indicator magnet 92 as to open after the first card cycle when the group indicator magnet 92 becomes energized. The contacts GI—8 are always closed during listing operations. Contacts L—3 are disposed in the circuit to the group indicator magnet 92 and are also disposed in a circuit extending to binder post 12 and including contacts Z—2. Contacts Z—2 are closed for tabulating and open when listing. These contacts are controlled by the list-non-list lever of the tabulator. Inasmuch as contacts Z—2 are held open at all times during listing operations the magnet 92 will not become energized at any time during the cycle either before or after the first card cycle. Therefore when the machine is set for listing the contacts GI—5 will remain open, magnet 22 will remain deenergized and, consequently, the transmission will be so controlled as to run the machine at the relatively slower listing speed. When the machine is set for tabulating contacts Z—2 will be closed. Then upon the end of the first card cycle cam contacts L—3 will close and bring about the energization of group indicator

magnet 92. Energization of 92 will close contacts GI—5 and thus bring about the energization of transmission control magnet 22. After this magnet has become energized the machine will continue to run at the higher tabulating speed. Contacts GI—5 having been opened during the first card cycle the machine will run at relatively lower speed during the tabulation of the first card of the group.

The only other contacts which are necessary to describe are those designated GI—8. These contacts open after the first card cycle when the group indicator magnet 92 is energized and they also remain closed always when the machine is set for listing. These contacts GI—8 are employed for establishing a supply of current to the printer magnets at all times when the machine is set for listing and also during the first card cycle when the machine is set for tabulating. In this way the group number may be printed when the machine is set for tabulating. For total printing other contacts control the circuits to the printing magnets.

Contacts X—1 are contacts which are closed as shown during listing operations and open during tabulating operations.

What I claim is:—

1. In a record controlled machine including tabulating devices, a driving means therefor and a speed changing transmission driven by said driving means and having provisions for driving the said tabulator at various speeds, and means responsive to the type of operation performed by the tabulating devices for automatically changing the speed driving ratios of said transmission device.

2. In a tabulating machine including in combination with a tabulator and driving devices therefor, a transmission device intermediate said driving devices and the said tabulator, and means for automatically controlling the effectivity of said transmission device controlled in accordance with the type of operation performed by the tabulator to drive the latter at high speed during high speed cycles and to drive the tabulator at lower speed for lower speed tabulating cycles.

3. In a record controlled machine including tabulating devices and a driving means therefor, a speed changing transmission intermediate the tabulator and driving means for driving the former at various speeds and means controlled in accordance with the type of operation performed by said tabulator for automatically changing the speed drive ratios in said transmission.

4. In a record controlled machine including tabulating devices and a driving means therefor, a speed changing transmission intermediate the tabulator and driving means for driving the former at various speeds and

means controlled in accordance with the type of operation performed by the tabulator for establishing automatically high or low speed driving conditions in said transmission whereby the tabulator is driven at high or low speed in accordance with the status of the control means in the tabulator.

5. In a record controlled machine including tabulating devices and a driving means therefor, a speed changing transmission intermediate the tabulator and driving means for driving the former at various speeds and means controlled in accordance with the type of operation performed by the tabulator for automatically controlling said transmission and effecting thereby a relatively low driving speed for the first card cycle and for thereafter automatically establishing in said transmission a relatively higher driving speed for the tabulator during subsequent card cycles.

6. In a record controlled machine including tabulating devices and a driving means therefor, a speed changing transmission intermediate the tabulator and driving means for driving the former at various speeds and means controlled in accordance with the type of operation performed by the tabulator for automatically controlling said transmission and for effecting thereby a relatively low driving speed for the tabulator when the latter is set for listing and for effecting thereby a relatively higher speed of drive for the tabulator when the latter is tabulating items and printing only the totals thereof.

7. In a record controlled printed tabulator including a shifting device for selecting listing or tabulating operation of said tabulator, a driving mechanism and a speed changing transmission intermediate said driving mechanism and said tabulator and means responsive to the type of operation performed by the tabulator and controlled by said shifting device for automatically selecting a low speed ratio for said transmission during listing operations and a high speed ratio during tabulating.

8. In a record controlled printing tabulator including a shifting device for selecting listing or tabulating operation of said tabulator and means for printing data during the first cycle of tabulating, a driving mechanism and a speed changing transmission intermediate said driving mechanism and said tabulator, means controlled by said shifting device for automatically selecting a low speed ratio for said transmission during listing operations and means controlled conjointly by said shifting device and said tabulator for automatically selecting a low speed ratio for the transmission during the initial cycle of tabulating operations and thereafter a high speed ratio for the subsequent tabulating cycles.

9. In a record controlled printing tabula-

tor, controlling mechanism for selecting tabulating operations involving printing or tabulating operations without printing, a driving mechanism and a speed changing transmission intermediate said driving mechanism and said tabulator and means controlled in accordance with the type of operation performed by said tabulator for automatically selecting a low speed ratio for said transmission during printing cycles and a high speed ratio during straight tabulating cycles.

10. In a record controlled printing tabulator, controlling mechanism for selecting tabulating operations involving printing or tabulating operations without printing, driving mechanism for said tabulator and a two-speed transmission intermediate said driving mechanism and said tabulator, said transmission comprising means normally biasing it for low speed operation suitable for printing operations and means controlled by said tabulator for yieldably setting said transmission for high speed operation during tabulating cycles without printing.

11. In a record controlled printing tabulator including controlling means for selecting tabulating operation involving printing or tabulating operation without printing, driving mechanism and a two speed transmission intermediate said driving mechanism and tabulator, said transmission including electromagnetic means for selecting the various speed ratios thereof, a control circuit for said electromagnetic means and means controlled by said tabulator for selectively controlling said circuit to automatically select a low speed ratio for operations involving printing and a high speed ratio for operations not involving printing.

12. In a record controlled printing tabulator including group indicating control mechanism for effecting printing of group designating data during the initial cycle of tabulating operations, driving means for said tabulator and a two speed transmission intermediate said driving means and said tabulator and means controlled by said group indicating mechanism for selecting a low speed ratio for said transmission during the initial cycle of tabulator operation and thereafter a high speed ratio.

13. In a record controlled printing tabulator including group indicating control mechanism for effecting printing of group designating data during the initial cycle of tabulating operations, driving means for said tabulator and a two-speed transmission intermediate said driving means and said tabulator, said transmission comprising an electromagnetic device for selecting a high or low speed driving ratio therefor, a control circuit for said electromagnetic device including a circuit actuator controlled by said group indicating mechanism for governing

the energization of said circuit to automatically select a low speed driving ratio for the initial cycle and thereafter a high speed driving ratio.

14. In a record controlled printing tabulator including controlling means for selecting listing or tabulating operation thereof and group indicating control mechanism for effecting printing of group designating data during the initial cycle of tabulating operations, driving means for said tabulator and a two speed transmission intermediate said driving means and said tabulator, means controlled jointly by said controlling means and said group indicating mechanism for automatically selecting a low speed ratio for said transmission during listing and during the initial cycle of tabulating and a high speed ratio for all tabulating cycles subsequent to the first.

15. In a record controlled printing tabulator including tabulating devices and printing devices and control circuits therefor, driving means for said tabulator and a two speed transmission intermediate the driving means and the tabulator, electromagnetic means controlled by the tabulator for controlling the printing control circuits to select tabulating operations with or without printing, and means controlled by said electromagnetic means for automatically selecting a low speed ratio for said transmission during cycles involving printing and a high speed ratio during cycles not involving printing.

16. In a record controlled printing tabulator including tabulating devices and printing devices and control circuits therefor, driving means for said tabulator and a two speed transmission intermediate the driving means and the tabulator, a shifting device comprising means for controlling said printing circuits to select listing or tabulating operation of said tabulator, means automatically controlled by said tabulator for controlling said printing circuits to effect printing during the initial cycle of tabulating operation and means controlled jointly by said last named means and said shifting device for selecting a low speed ratio for said transmission during printing cycles and a high speed ratio during non-printing cycles.

17. In a record controlled printing tabulator including tabulating devices and printing devices and control circuits therefor, driving means for said tabulator and a two speed transmission intermediate the driving means and the tabulator, said transmission including electromagnetic means for selecting high or low speed ratios therefor and a control circuit for said electromagnetic means, a shifting mechanism comprising means for controlling said printing circuits to select listing or tabulating operation of said tabulator, group indicating controlling

mechanism including electromagnetic means for automatically controlling said printing circuits to effect printing of group designating data during the initial cycle of tabulating operations and means controlled jointly by said shifting mechanism and said last named electromagnetic means for controlling said transmission control circuit to automatically select a low speed ratio for said transmission during printing cycles and a high speed ratio during non-printing cycles.

In testimony whereof I hereto affix my signature.

RALPH E. PAGE.