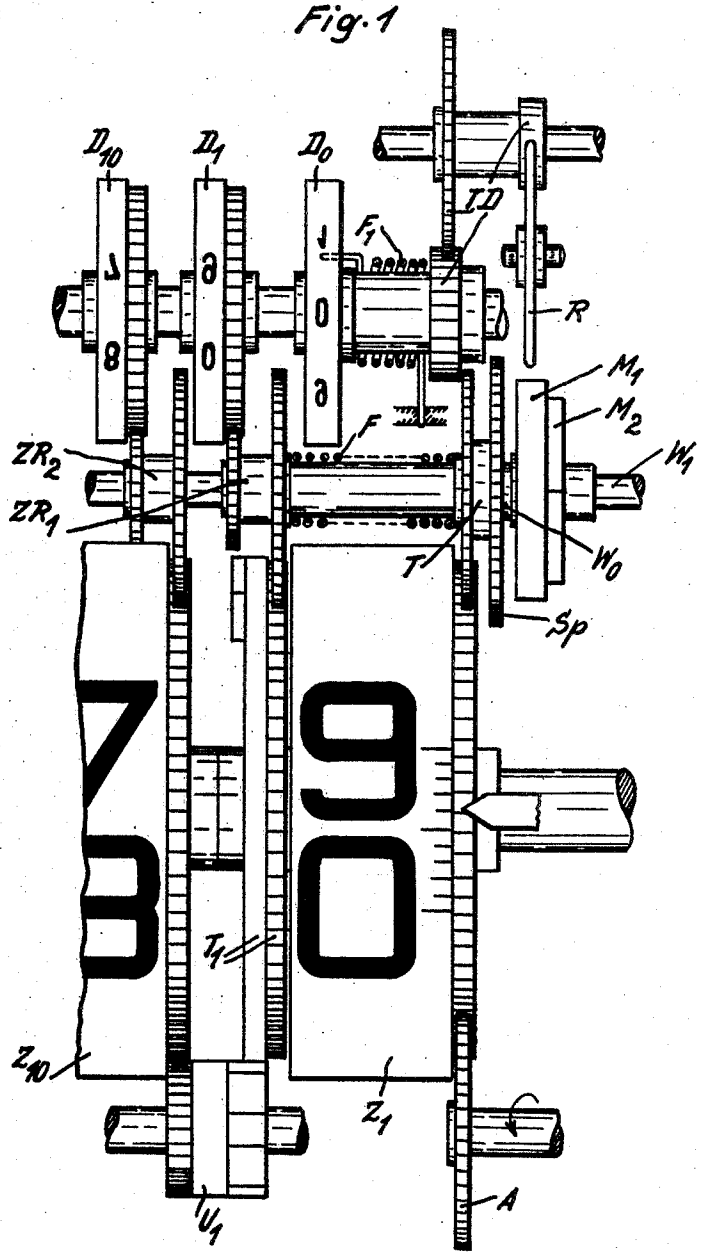
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PRINTING MECHANISM FOR FLUID METERS

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Fig. 1



Inventors.
Heinz Goy, &
Horst Gläser.
By
Atty.

Feb. 9, 1965 H. GOY ETAL 3,168,981

PRINTING MECHANISM FOR FLUID METERS

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Fig. 2a

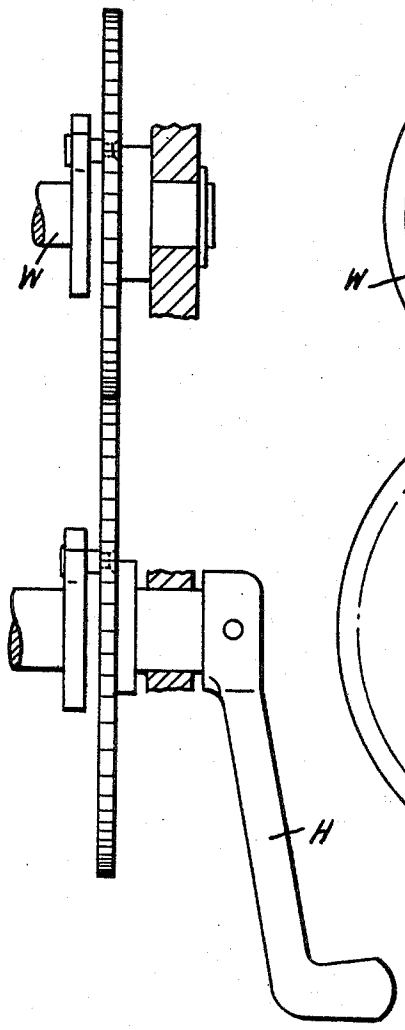
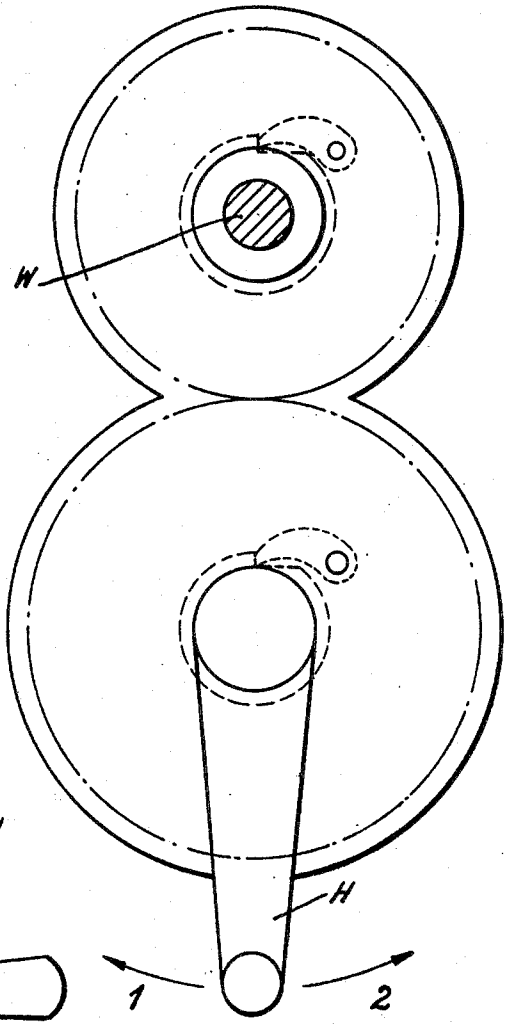


Fig. 2b



Inventors.
Heinz Goy, &
Horst Gläser,
By
Atty.

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Fig. 3a

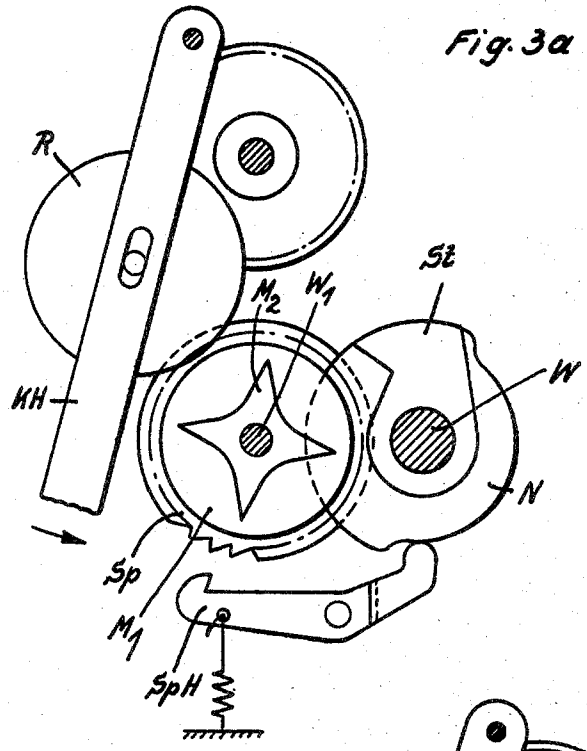
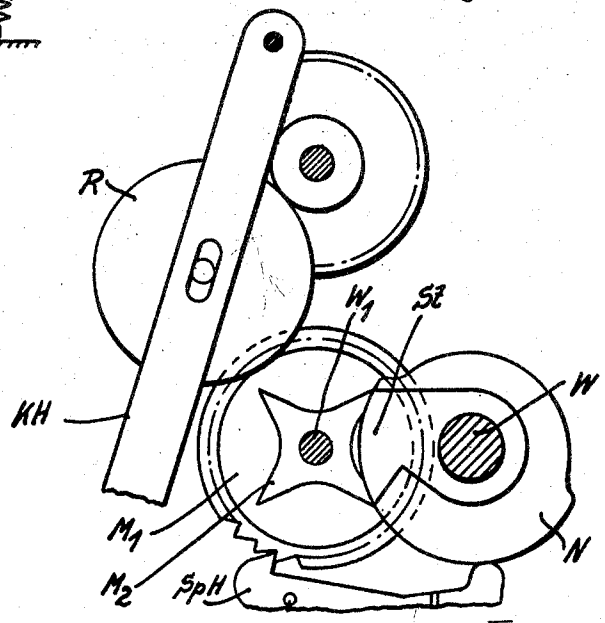


Fig. 3b



Inventors.
Heinz Goy, &
Horst Gläser.

By.

Atty.

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3,168,981

PRINTING MECHANISM FOR FLUID METERS

Heinz Goy, Berlin-Tempelhof, and Horst Glaser, Berlin, Germany, assignors to Siemens & Halske Aktiengesellschaft, Berlin and Munich, a corporation of Germany

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4 Claims. (Cl. 235—58)

This invention relates to apparatus for controlling the printing wheels associated with a printing mechanism for registering the measured values in connection with a fluid meter and is particularly concerned with a printing mechanism, comprising printing wheels cooperatively associated with number wheels, operatively controlled by a measuring device, and having a further printing wheel serving for the printing of fractional measuring values lying between full number values set at a printing wheel cooperatively associated with the most rapidly rotating number wheel, namely, the units number wheel.

In known printing mechanisms of this kind, the further (fractions-) printing wheel is driven over a gear from the units number wheel which is continuously driven under the control of the measuring device, while the printing wheel assigned to the units number wheel is, for obtaining a setting corresponding to that of the associated number wheel, actuated under the control of the fractions printing wheel. Accordingly, for example, in a decadic subdivision of the measuring values, the fractions printing wheel will be rotated with ten-times the speed of rotation of the continuously driven units number wheel. Since each printing wheel of the next higher decade is set under control of the preceding printing wheel, the stepping of the printing wheels of higher decades will be effected with ten times the speed of rotation of the units number wheel, and it follows, therefore, that the measuring device must produce great torque which in turn affects its measuring accuracy.

In order to avoid this drawback, it has already been proposed to provide a mechanism wherein the units number wheel is effective to continuously drive the printing wheel assigned thereto and also to drive the further fractions-printing wheel.

In order to further reduce the driving power required, the printing mechanism according to the present invention is constructed so that the units number wheel is operative to drive continuously the printing wheel respectively assigned thereto and also an initially idling auxiliary mechanism which is adapted to indicate the position—full number or fraction—assumed by the units number wheel. In the event that the units number wheel has assumed a fraction position, the auxiliary mechanism is, by a force which is applied after the setting of the number wheel mechanism and determining the printing operation, rotated back by an angle corresponding to the fraction position with respect to the preceding full number position, thereby also effecting appropriate setting of the printing wheel assigned to the respective number wheel and adjustment of the further fraction-printing wheel, which is operatively coupled to the auxiliary mechanism, in accordance with the amount of the return motion of the auxiliary mechanism.

Details of the invention will now be explained with reference to the accompanying drawings.

FIG. 1 shows an embodiment of a printing mechanism for a fluid meter with decadic subdivision of the measuring values;

FIGS. 2*a* and 2*b* show details to aid in explaining the operation of the auxiliary device; and

FIGS. 3*a*, 3*b* show further details concerning the operation of the auxiliary device.

Referring now to FIG. 1, a fluid meter (not shown) drives the spur gear A to effect continuous rotation of the units number wheel Z_1 which is the number wheel rotating at highest speed. This units number wheel rotates the intermediate drive T, idling upon a hollow shaft W_0 and comprising a toothed detent or locking gear S_p which is over a spring F coupled with the intermediate wheels ZR_1 thereby rotating such intermediate gear, the latter meshing with the drive T_1 which is free of the units number wheel Z_1 and rotating the drive T_1 in step with the units number wheel, the drive T_1 being in turn effective to advance by one step the switch-over drive U_1 and the tens number wheel Z_{10}. The remaining not illustrated number wheels of higher decadic order are advanced in similar and well known manner. One of the intermediate wheels ZR_1, which are keyed to the hollow shaft W_0, drives the units printing wheel D which is assigned for cooperation with the units number wheel Z_1, thereby advancing this printing wheel D_1 correspondingly. The tens printing wheel D_{10} is advanced by the action of the intermediate wheels ZR_2 which are rotated incident to the advance rotation of the tens number wheel Z_{10}.

The hollow shaft W_0 is taken along by the rotation of the intermediate wheels ZR_1, and the auxiliary device M_1–M_2 is thus with an as yet idling motion continuously driven (just as the units number printing wheel D_1) under control of the units number wheel Z_1. The gear ratio for advancing the auxiliary mechanism M_1–M_2 is such that it rotates with a speed amounting to 2.5 times the speed of the units number wheel Z_1. As shown in FIGS. 3*a* and 3*b*, the part M_2 of the auxiliary device is made in the form of a star wheel provided with four teeth. Accordingly, an advance of the star wheel by one tooth corresponds to an advance of the units number wheel Z from one full number position to the next or to the running through ten fraction positions. The position assumed by star wheel M_2, after the setting of the number wheel mechanism, accordingly indicates the position—full number of fractional number position—which had been assumed by the units number wheel Z_1.

In the example illustrated in FIG. 1, the units number wheel Z_1 has assumed a fractional position lying between the full number positions 9 and 0, thus marking, apart from the positions of the number wheels of higher decades, the units value 9.4 which has now to be printed. A force is now applied, in the illustrated embodiment manually, to rotate the lever H shown in FIGS. 2*a* and 2*b*, in the direction indicated by the arrow 1. This effects over intermediate gear wheels a rotation of the shaft W, thereby pressing the member S*t* (FIG. 3*a*) against the flank of a tooth of the star wheel M_2 of the auxiliary device and angularly rotating it to the position shown in FIG. 3*b*. The auxiliary device M_1–M_2 which is in this manner rotated back, is held in this position by the member S*t* which acts as a stop or locking member.

The back or return rotation of the auxiliary device also affects by the action of the intermediate wheels ZR_1 the units number printing wheel D_1 which is rotated back from its intermediate position between 9 and 0 to the position 9. The units number wheel Z_1 is held in its 9.4 position by the detent lever S*p*H (FIGS. 3*a*, 3*b*) which is pressed into the locking wheel S*p* by the action of the cam N (FIGS. 3*a* and 3*b*) such cam being carried by the shaft W. The part M_1 of the auxiliary device is coupled with the fraction number printing wheel D_0 over the friction wheel R and the drive TD, such coupling being effected by the coupling lever KH (FIGS. 3*a*, 3*b*) which is moved in the direction indicated by the arrow. The fraction number printing wheel D_0 is incident to the return rotation of the auxiliary device M_1–M_2 rotated by four steps (four fraction lines of the units number

wheel Z_1) thus effecting, through suitable means, not illustrated the printing of the measured value 9.4 by the printing wheels D_1 and D_0. Since the units number wheel Z_1 is locked in the 9.4 position assumed thereby, the measured value thus indicated can be easily checked against and compared with the value actually printed.

The number wheels and printing wheels are rotated to normal position responsive to rotating the lever H (FIGS. 2*a*, 2*b*) in the direction of the arrow 2, the restoration of the respective wheels to the zero position being thereby effected in known manner which does not form part of the invention. The fraction number printing wheel D_0 is restored to normal by the force applied by the spring F_1.

Changes may be made within the scope and spirit of the appended claims which define what is believed to be new and desired to have protected by Letters Patent.

We claim:

1. Apparatus for controlling the printing wheels of a printing mechanism associated with a measuring device, said apparatus having number indicating wheels including a units number indicating wheel, which are driven by the measuring device, and having number printing wheels cooperating with the respective number indicating wheels, and having a further fractions-printing wheel for cooperation with the units number indicating wheel, a rotatable auxiliary device selectively operatively connecting said units number indicating wheel with said fractions-printing wheel, means driven by said units number indicating wheel for steadily advancing the units number printing wheel cooperating therewith and for coincidently actuating said auxiliary device which is operative in initially idling motion to assume a position corresponding to the respective full number or fraction number position assumed by said units number indicating wheel, and means independently operable, in the event that the units number indicating wheel has been set to a fraction value, for operably connecting said auxiliary device to said fractions-printing wheel and for actuating said auxiliary device in reverse order of operation by an amount corresponding to the difference between the fractional position of the units number indicating wheel and the last attained full number thereof, thereby coincidently resetting the respective units number printing wheel to the full number attained last by the units number indicating wheel and simultaneously setting the fractions printing wheel in accordance with the fraction number attained by the units number indicating wheel, whereby said printing wheels are set for printing the measured units and fractions thereof.

2. A control apparatus according to claim 1, wherein said rotatable auxiliary device comprises a toothed wheel provided with a number of teeth corresponding to the ratio between the number of fractions at the units number indicating wheel and the gear ratio which determines the speed of revolution of the auxiliary device.

3. A control apparatus according to claim 2, comprising a member cooperating with said toothed wheel, for effecting said reverse operation of said auxiliary device and for locking it in its reversed position.

4. A control apparatus according to claim 1, comprising intermediate gear means, drive means for resiliently coupling said units number indicating wheel with said gear means, said gear means driving the units number printing wheel, and a locking device for holding the units number indicating wheel in its attained position during the resetting of the units number printing wheel.

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