Feb. 10, 1942. F. A. POOLE 2,272,478

COUNTING DEVICE

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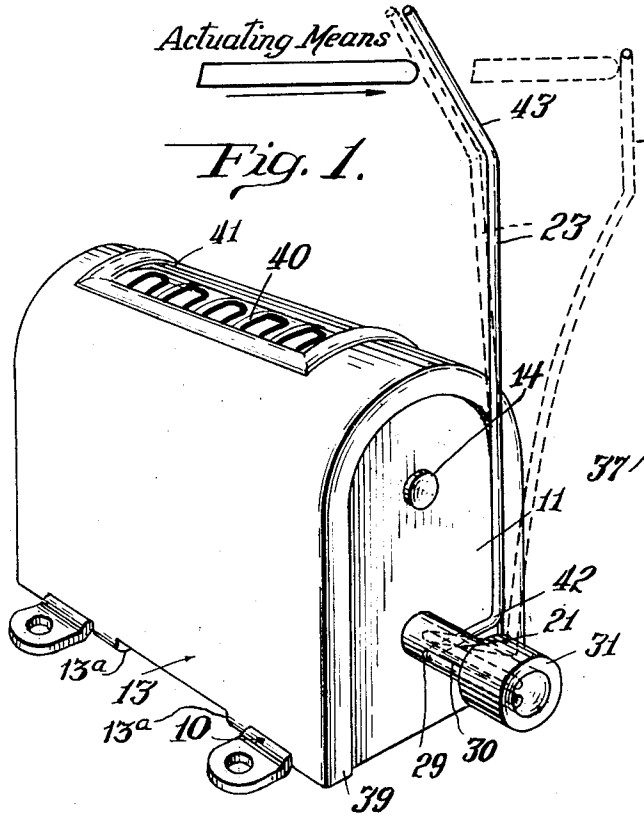


Fig. 1.

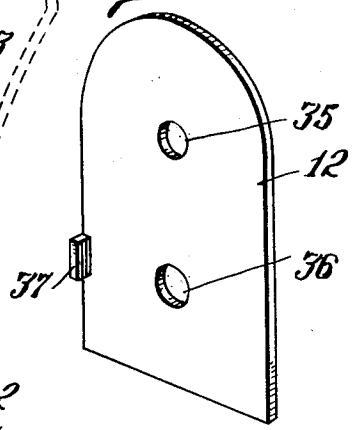


Fig. 3.

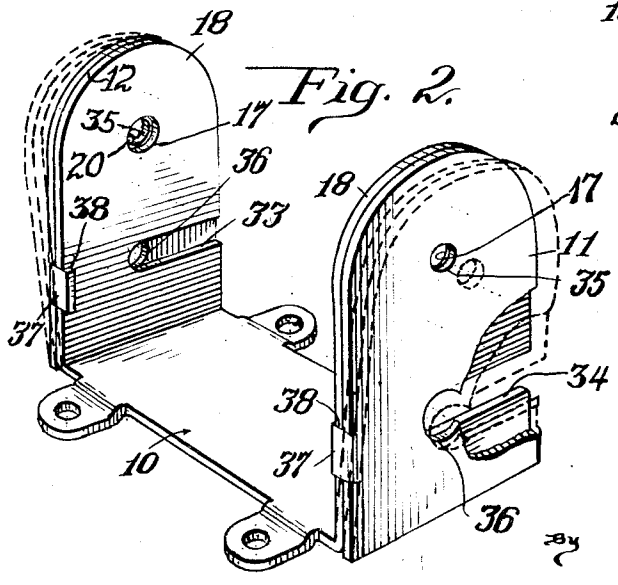


Fig. 2.

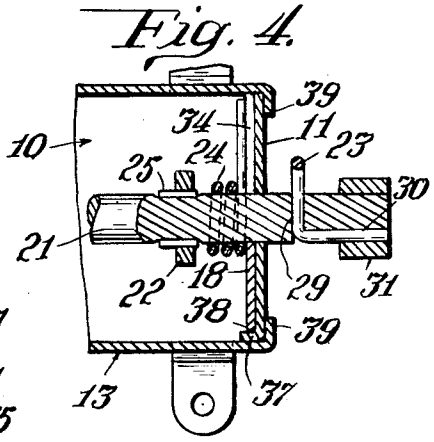


Fig. 4.

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COUNTING DEVICE

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Fig. 5.

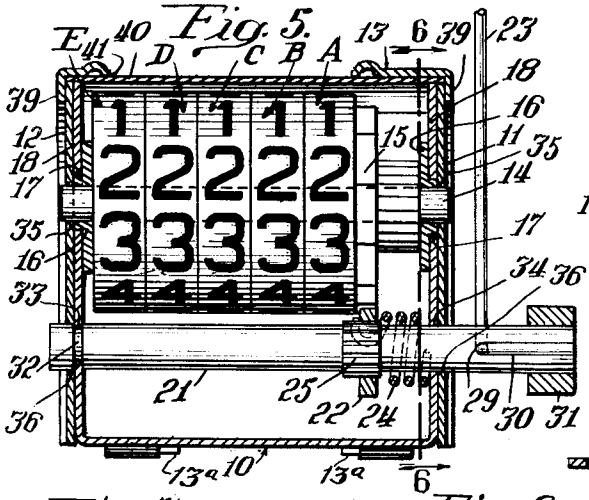


Fig. 6.

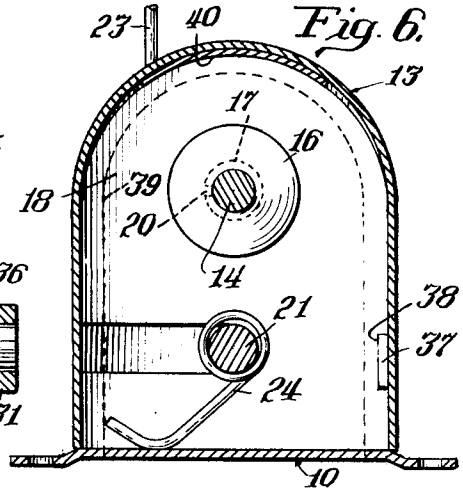


Fig. 7.

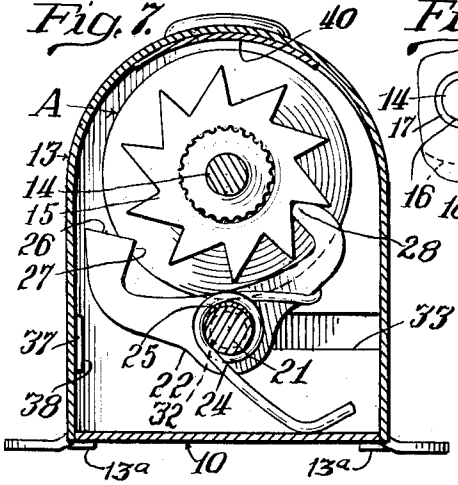


Fig. 9.

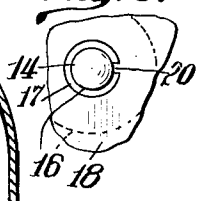
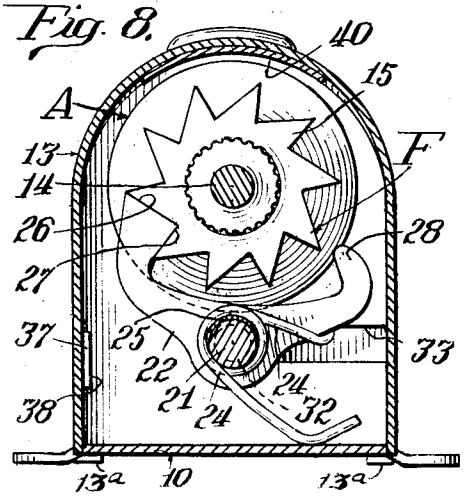


Fig. 8.



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Patented Feb. 10, 1942

2,272,478

UNITED STATES PATENT OFFICE

2,272,478

COUNTING DEVICE

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Application December 10, 1938, Serial No. 244,983

6 Claims. (Cl. 235—1)

This invention relates to improvements in counting apparatus.

The principal object of the invention is to provide a counting apparatus in which the several parts are improved with a view of simplifying the manufacture of the parts, insuring accuracy of operation and facilitating their application to their applied position without requiring adjustment of the several elements.

According to the invention, a plurality of numeral indicating elements are assembled in their cooperative relation on a supporting shaft so that the several elements may be conveniently inserted as a unitary structure in a frame member. The said frame member serves as the bottom member of a housing for enclosing the operating parts and is formed with angularly disposed ends adapted to be flexed outwardly to permit the insertion of the numeral indicating structure to its applied position in the frame.

The reflex pressure of said frame against spacing washers fixed to the end portions of the shaft exerts a clamping action thereon to prevent displacement of the shaft in the frame.

The operating means for producing partial rotations of the numeral indicating means include a double ratchet member in the form of a pallet arm, a spring member therefor, and a flexible lever arm, all of which are mounted on a shaft so that they may be inserted in the frame as a unitary structure, the end members of the frame being formed with open slots to receive the shaft. The said operating shaft is locked in its applied position and the pallet arm spring is maintained in a flexed or tensioned condition by the cooperation of separable plate members which form the end walls of the housing structure. The said plate members engage the ends of the operating shaft and an edge of the said frame so as to hold the shaft in its applied position. A slip-over cover member which forms the top and sides of the housing overlaps the marginal portion of the end plates so as to clamp them to the frame member.

It is, therefore, a specific object of the invention to provide a counting device having the improved construction hereinabove briefly described for carrying out the above stated objects and such other objects as will appear from the detailed description of the invention.

Other objects and advantages will appear from the fuller description given hereinafter of the constructions shown in the accompanying drawings.

In the drawings:

Fig. 1 is a view in perspective of a counting device constructed in accordance with this invention.

Fig. 2 is a view in perspective of certain parts of the housing structure with parts of one element broken away.

Fig. 3 is a view in perspective of one of the end members of the counter housing.

Fig. 4 is a fragmentary sectional view taken through a portion of the operating shaft and the housing.

Fig. 5 is a vertical sectional view taken through the counting mechanism.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 5 and looking in the direction indicated by the arrows.

Figs. 7 and 8 are sectional views taken substantially on line 6—6 of Fig. 5 and looking toward the left of said figure, and

Fig. 9 is a fragmentary view illustrating a lock for holding the numeral indicating wheel shaft against arcuate movement.

Referring to the drawings, the housing is composed of a number of separately formed members including a base member 10, separate end plates 11 and 12 and a slip-over cover 13, the latter of which is adapted to lock the other housing elements in position. The several housing elements are similar to the corresponding elements shown in the United States Letters Patent 2,046,810 dated July 7, 1936, but includes various improvements hereinafter described in connection with the detail description of the said housing elements and their cooperation with the numeral indicating and the operating mechanisms.

The numeral indicating mechanism is composed of a plurality of numeral wheels designated A, B, C, D and E, which are rotatably mounted on a shaft 14. The wheel A indicates the unit position of a number and the wheels B, C, D and E indicate, successively, the numeral positions of higher order. The numeral wheels are connected in a known manner whereby a complete revolution of the unit wheel A imparts a one-tenth revolution to the numeral indicating wheel B. Likewise the complete revolution of any numeral wheel imparts a one-tenth revolution to the next adjacent numeral wheel of higher order.

A ratchet wheel 15 having ten teeth of substantially the configuration shown in the drawings is secured to one side of the unit numeral wheel A. The several numeral indicating wheels and the ratchet wheel are revolubly mounted on the shaft

14 and are held in proper position thereon by means of spacing washers 16—16. The said spacing washers are fixed to the shaft and may be regarded as a part of the shaft structure. The outer faces of the washers are formed with reduced portions or hubs which fit into punched openings 17—17 formed in the angularly disposed end portions 18—18 of the frame member 10. One of the said punched openings 17 is preferably provided with an inwardly projecting lug 20 which extends into a recess formed in the hub portion of one of said spacing washers 16 so as to lock the shaft structure against rotational movement in the frame. Preferably, the several indicating wheels, the ratchet wheel 15 and the shaft 14, including the fixed spacing washers 16—16, are assembled in their proper relation so that they can be inserted as a unitary structure in the end members 18—18 of the frame 10. In order to permit the assembled indicating mechanism to be inserted as a unitary structure in the frame, the end members 18—18 of the frame are adapted to be flexed outwardly, as shown in Fig. 2, to permit the ends of the shaft 14 and the hub portions of the said spacing washers 16—16 to enter the openings 17—17 formed in the end portions of the frame. This improved feature, over the patented housing structure previously mentioned, provides for a resilient clamping action on the shaft by virtue of the reflex of the end members of the frame against the washers 16—16 fixed on the shaft. The said clamping action resists any tendency which the shaft, including the spacing washers 16—16 fixed thereon, may have to vibrate in the openings 17, when the counting device is operated at high speed.

The operating mechanism comprises a shaft 21, a double ratchet member in the form of an anchor pallet 22 fixed on the shaft, a resilient operating lever arm 23, and a spring member 24 for returning the shaft and other members thereon to their normal position. The pallet arm 22 is pressed tightly upon the shaft 21, the latter being formed with knurled ridges or teeth 25 which cut into the central opening of the pallet arm and lock it in a fixed position on the shaft. One end of the arm 22 is formed with flat surfaces 26—27, the former of which is adapted to engage the edge of a ratchet tooth, during the actuated movement of the operating arm 23, and thereby impart a partial rotation to the ratchet wheel and unit indicating wheel. When the operating lever 23 reaches the limit of its actuated movement the surface 27 of the pallet arm and the surface 26 thereof substantially fill the entire space intervening between two adjacent ratchet teeth of the ratchet wheel and thereby provide a positive stop for limiting the movement of the ratchet wheel. The other end of the pallet arm 22 is rounded, as indicated at 28, and is adapted upon oscillation of the pallet arm in the opposite direction to engage over a tooth, for example, the tooth F shown in Fig. 8 of the drawings, so as to exert a camming action on the inclined face of said tooth and thereby impart another partial rotation to the ratchet wheel 15 and the unit numeral wheel attached thereto. The last mentioned movement of the ratchet wheel 15 is produced by means of the reflex of the spring 24, one end of which engages the last mentioned end of the pallet arm and the other end of which bears against the bottom of the housing member 10. The operating lever 23 is preferably a piece of flexible, resilient wire, one end of which is inserted through a hole 29 formed in the shaft and then bent lengthwise of the shaft to fit into a slot 30, as indicated in Figs. 1 and 4. A locking sleeve 31 is then pressed upon the end of the shaft so as to overlie the portion of the spring wire which lies within the slot 30 of the shaft and thereby firmly locks the operating lever arm to the shaft. This form of connection permits quick convenient attachment of the arm with the shaft and avoids any accidental displacement thereof relative to the shaft during the high speed operation of the counting mechanism or during the vibration of the arm. The other end of the shaft 21 is grooved, as indicated at 32, so as to embrace the upper and lower edges of a slot 33 formed in one end portion 18 of the frame member 10. The other end member of the frame is formed with a somewhat wider slot 34 adapted to receive the other end of the shaft 21. The location of the shaft 21 intermediate the shaft 14 and the base portion 10 of the frame rigidifies the frame.

In applying the operating mechanism to its applied position, the annular groove 32 in the shaft is aligned with the slot 33 in the housing frame and the said shaft is moved laterally in the said slots 33—34 to the inner ends of the slots. During this applying movement the shaft is rocked in a manner to permit the end 26 of the pallet arm 22 to pass beneath the ratchet wheel of the previously applied numeral indicating means and thereby permit the opposite ends of the pallet arm to assume their proper position on opposite sides of the ratchet wheel. During this applying movement, the diverging ends of the spring 24 are flexed toward each other and are therefore tensioned so as to normally hold the end 28 of the pallet arm against the ratchet wheel as indicated in Fig. 7. The spring tension in the said spring 24 has a tendency to move the shaft 21 laterally in the supporting slots toward the open ends thereof. This tendency, however, is resisted by the provision of the end plates 11 and 12 with punched openings 35—36 for receiving the end portions of shafts 14 and 21 and by forming the said plates with lugs 37—37 which fit in slots 38—38 formed in the edges of the end members 18—18 of the frame as shown in Figs. 2, 7 and 8. The tension in the diverging ends of the spring, in addition to holding the end 28 of the pallet arm against the ratchet wheel also holds the said lugs 37—37 resiliently against the edges of the frame members 18—18. The said end members 11—12, except for the said lugs 37—37, are in the form of flat plates, as distinguished from the flanged plate disclosed in the said prior Patent 2,046,810, so as to simplify their manufacture. The said resilient engagement of the lugs 37—37 with the edges of the frame members 18—18 serves to lock the plates 11 and 12 in their applied position when the slip-over cover 13 is removed. However, when the slip-over cover 13 is applied, the end plates 11 and 12 are further locked in their applied position by means of flanges 39 formed on the cover 13 to overlie the marginal portions of the end members 11—12. The lower edge of the housing is provided with lugs 13a (Figs. 1, 5, 7 and 8) adapted to be bent beneath the base portion of the frame 10.

Before applying the said slip-over cover 13, a strip of transparent material 40, for example, a strip of Celluloid, is positioned in the upper portion of the cover so that it is clamped between said cover and the upper edges of the frame members 18—18 and thereby provides a transparent closure for the window opening 41 of the housing.

In operation the ratchet wheel 15 is given partial rotations, both during the actuated move-

ment of the lever **23** and during the return movement thereof, the operating pressure during the return movement of the lever being provided by the spring **24**. In this way the ratchet wheel **15** and the unit numeral indicating wheel are given an arcuate movement of 36° and at the same time maintain the movement of the operating lever **23** well within the range of 20°. The said operating lever **23** being made of flexible, resilient material, may be bent to any desired position, for example, as indicated at **42** and **43**, so as to suitably position said lever with relation to any means which may be employed to actuate the same. The actuating means may be a movable element of a machine to which the arm **23** may be attached or the said lever arm may be operated by means of a wiping contact with a movable object, such as indicated diagrammatically in Fig. 1. In either event, the flexible lever may be readily bent, as indicated at **42** and **43**, whereby the lever may be properly positioned relative to the actuating means and without requiring adjustment of any of the operating parts within the housing. Furthermore, the flexibility of the arm, as illustrated in dotted lines, permits it to move beyond the arcuate travel range of the pallet arm **22** and thereby compensate for any excessive movements of the actuating means. The actuated movement of the lever **23** imparts an arcuate movement to the ratchet wheel **15** and the unit numeral indicating wheel equal to approximately one-half the space required for one numeral on the wheel. At the end of this movement the pallet arm functions as a positive stop to prevent coasting or overthrow of the ratchet wheel. As soon as the lever **23** is released from the actuating means, the action of the spring **24** returns the pallet arm **22** and lever **23** to their normal positions. During this return movement, the end **28** of the pallet arm engages over the ratchet tooth F and functions as a cam against the inclined face thereof to impart an arcuate movement to the ratchet wheel and associated numeral wheel corresponding to the remainder of the numeral space. It will be seen, therefore, that partial rotations equal to one-half of one numeral space are imparted to the ratchet and unit numeral wheel during both the forward and reverse strokes of the lever **23**.

I claim:

1. In a counting device, the combination of numeral indicating means comprising a shaft and a numeral wheel and a ratchet wheel associated therewith assembled on the shaft to provide a unitary structure, a supporting frame therefor comprising a base member having angularly disposed end portions spaced from each other a distance less than the length of said shaft and formed with openings to receive the ends of said shaft and adapted to be flexed outwardly to permit said unitary structure to be inserted laterally between said end portions of the frame, a second shaft mounted in openings in said end portions of the frame at a location intermediate the first mentioned shaft and the base portion of the frame, and operating means mounted on said second shaft for engagement with said ratchet wheel.

2. In a counting device, the combination of numeral indicating means comprising a shaft structure and numeral wheel and a ratchet wheel revolubly assembled on the shaft to provide a unitary structure, a supporting frame therefor comprising a base member having angularly disposed end portions spaced from each other a distance less than the length of said shaft and formed with openings to receive the ends of said shaft structure and adapted to be flexed outwardly to permit said unitary structure to be inserted between said end portions of the frame, one of said openings being formed with an inwardly projecting lug and a portion of the shaft structure having a slot therein to receive the lug to lock the shaft structure against rotation, and operating means mounted in said frame including a shaft fitted in openings in said end portions of the frame at a location intermediate said numeral wheel and the base portion of the frame, and a pallet arm on the shaft for engagement with said ratchet wheel.

3. In a counting device, the combination of numeral indicating means comprising a shaft and a numeral wheel and a ratchet wheel revolubly assembled on the shaft to provide a unitary structure, a supporting frame therefor comprising a base member having angularly disposed end portions spaced from each other a distance less than the length of said shaft and formed with openings to receive the ends of said shaft and adapted to be flexed outwardly to permit said unitary structure to be inserted laterally between said end portions of the frame, and operating means comprising an operating shaft journaled in the end portions of the frame at a location intermediate said first mentioned shaft and the base portion of the frame, a U-shaped pallet arm fixed to the operating shaft and adapted to embrace the lower portion of the ratchet wheel, there being lateral slots in the said end portions of the frame for receiving the operating shaft, whereby the operating means may be applied as a unit by lateral movement in said slot.

4. In a counting device, the combination of numeral indicating means comprising a shaft and a numeral wheel and a ratchet wheel revolubly assembled on the shaft to provide a unitary structure, a supporting frame therefor comprising a base member having angularly disposed end portions formed with openings to receive the ends of said shaft and adapted to be flexed outwardly to permit said unitary structure to be inserted laterally between said end portions of the frame, and operating means comprising an operating shaft journaled in the end portions of the frame at a location intermediate said first mentioned shaft and the base portion of the frame, a U-shaped pallet arm fixed to the operating shaft and adapted to embrace the lower portion of the ratchet wheel, a coiled spring on the operating shaft having an end engaging one end of the pallet arm and the other end adapted to bear against the bottom portion of the frame so as to be tensioned by the applying movement of the said operating shaft, there being lateral slots in the said end portions of the frame for receiving the operating shaft, whereby the operating means may be applied as a unit by lateral movement in said slot.

5. In a counting device, the combination of numeral indicating means including a shaft and a numeral wheel and a ratchet wheel assembled on said shaft, a supporting frame in which the said shaft is mounted comprising a base member and angularly disposed end portions formed with apertures for receiving the end portions of said shaft and adapted to be flexed outwardly to permit said shaft to be inserted laterally between the said end portions of the frame, and operating means comprising an operating shaft journaled in the said end portions of the frame intermediate said first mentioned shaft and the base member of the frame, a U-shaped pallet arm

fixed to the operating shaft and adapted to embrace the lower portion of the ratchet wheel, a coiled spring on the operating shaft having an end engaging one end of the pallet arm and the other end adapted to bear against the bottom portion of the frame so as to be tensioned by the applying movement of the said operating shaft, there being lateral slots in the said end portions of the frame for receiving the operating shaft, whereby the operating means may be applied as a unit by lateral movement in said slots, and end plate members engaging the said operating shaft and each having a lug adapted to engage over an edge of an abutting end portion of the said frame member to retain the operating means in its applied position in opposition to the tension of said spring.

6. In a counting device having a numeral indicating wheel and a toothed wheel having a fixed relation to the numeral wheel, unitary operating means for the toothed wheel comprising a shaft, a pallet arm fixed to the shaft, and a bendable lever secured to the shaft whereby the operating means may be applied as a unitary device and the lever then bent to a position for engagement with means for actuating the lever.

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