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POWDER MEASURING MACHINE

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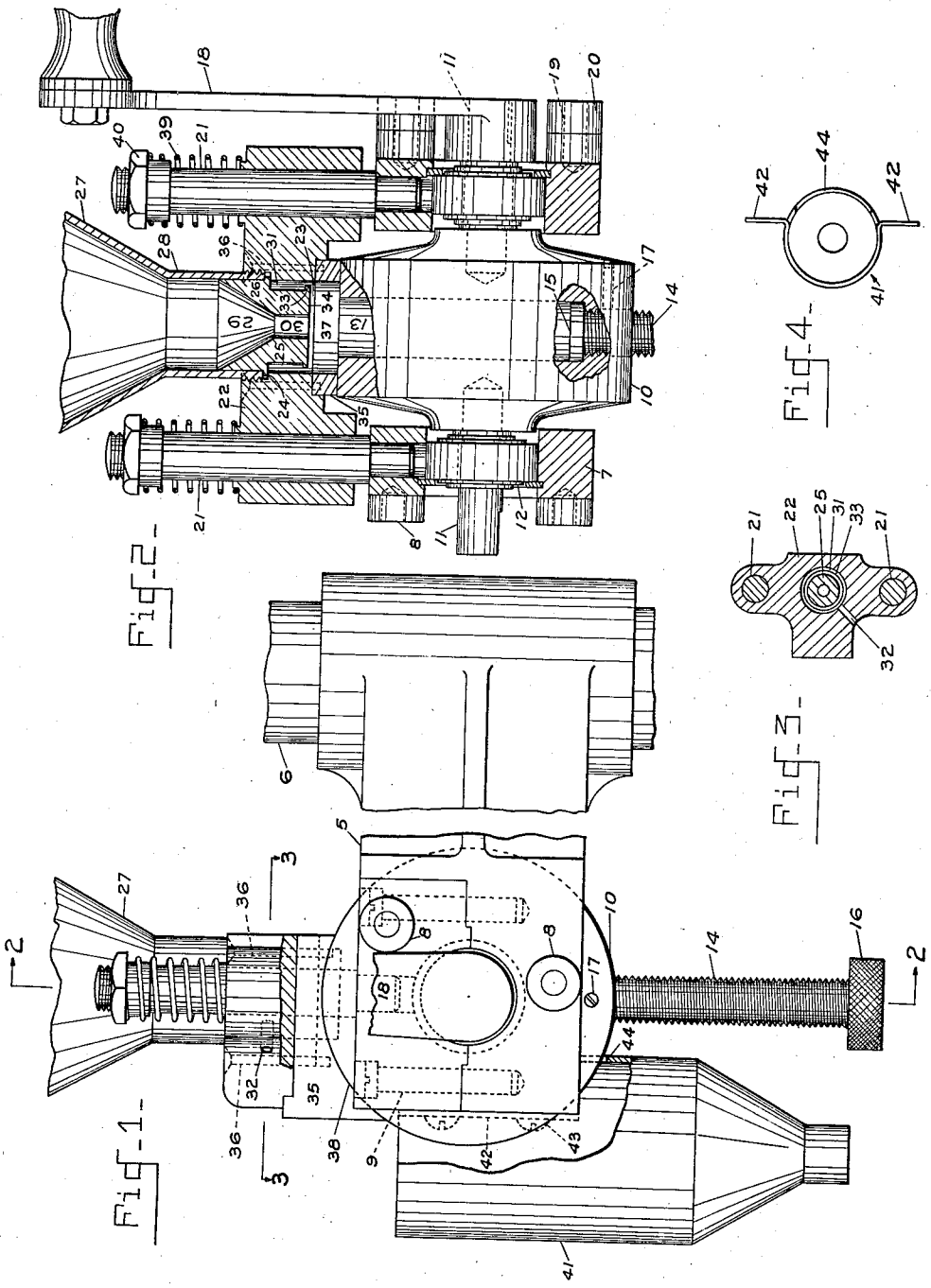


Fig-1-

Fig-2-

Fig-3-

Fig-4-

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POWDER MEASURING MACHINE

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3 Claims. (Cl. 221—107)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to us of any royalty thereon.

This invention relates to powder measuring machine.

In loading elements of ammunition with powder the method of weighing individual charges in order to secure uniformity and accuracy is too slow for quantity production. The purpose of this invention is to provide a volumetric measuring machine which will possess a high degree of accuracy and be capable of rapid operation.

Further objects are to provide a machine whose accuracy will not be affected by looseness of bearings or by wear of the working parts and one in which air locks or cavities will be avoided and in which the pressure effect of the variable quantity of the material in the hopper will be minimized.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawing in which:

Fig. 1 is a view in side elevation of the improved machine.

Fig. 2 is a sectional view on the general line 2—2 of Fig. 1.

Fig. 3 is a sectional view on the line 3—3 of Fig. 1.

Fig. 4 is a plan view of the funnel.

Referring to the drawing by characters of reference there is shown a support comprising a bracket 5 adjustably carried on a standard or column 6. The outer end of the bracket is formed with spaced half-bearings 7 each of which is completed by a bearing block 8 secured by means of bolts 9.

A cylindrical rotor 10 disposed between the bearings is provided on its opposite sides with trunnions 11—11 which are mounted in anti-friction units 12 in the bearings. The rotor is formed with a diametral measuring chamber 13 of predetermined capacity having a reduced threaded lower extremity for receiving a bolt 14. The bolt is formed with a head 15 which has a close sliding fit in the chamber 13 and serves to provide a movable floor for the chamber whereby its volume may be varied. A nut 16 on the outer end of the bolt serves as a thumbwheel for rotating the bolt. The bolt may be held in adjusted position in any suitable manner, conveniently by a set screw 17.

A crank handle 18 fixed on one of the trunnions serves to rotate the rotor approximately 150 degrees between the limits of a pair of stop members 19 fixed on the bearing. The stop members are provided with shock absorbing rubber bushings 20 to eliminate the tamping or jarring effect on the material being measured.

A pair of upright pins 21—21 one of which is mounted in each of the bearing blocks 8—8, slidably carry a cut-off block 22 which is preferably of bronze. The central portion of the block 22 is provided with an aperture 23 which is counterbored to provide an annular shoulder 24. A choke adapter 25 inserted in the aperture is formed with an annular flange 26 which rests on the shoulder 24 and is confined by means of a hopper 27 whose neck 28 is inserted in the aperture and threaded to the cut-off block. The adapter is formed with a funnel-shaped passage, the upper flaring portion 29 being substantially equal to the internal diameter of the neck 28 and the lower cylindrical portion 30 being preferably less than the diameter of the chamber 13 in the rotor. This arrangement permits uniform packing of the powder in the chamber 13 by minimizing the variable pressure or weight exerted by the variable amount of powder in the hopper.

The lower portion of the choke adapter 25 is of reduced diameter to provide an annular air space 31 between its outer wall and the inner wall of the block 22 defining the aperture 23. A vent 32 formed in the block 22 leads to the air space 31 as clearly seen in Fig. 3. The lower extremity of the choke adapter is formed with an annular flange 33 to restrict the entrance to the air space 31 and preclude the free entry of powder. The lower face 34 of the adapter is in spaced relation to the rotor. This arrangement permits the escape of air from the measuring chamber while being filled with powder and thereby the formation of air locks or voids is prevented.

The cut-off block 22 engages the rotor by means of an insert 35 which is held in a groove in the under side of the block 22 by means of screws 36. The insert is formed with an aperture 37 in alignment with the aperture 23 and it has an arcuate lower surface 38 for contacting the rotor.

The cut-off block is held in contact with the rotor by its own weight supplemented by pressure from a pair of springs 39—39, each of which embraces one of the pins 21 and is confined between the block and a nut 40 threaded on the upper end of the pin. By this means the pressure may be regulated to obtain a satisfactory cut-off of the powder when the rotor is angularly

displaced to move the entrance to the measuring chamber clear of the powder in the aperture 37.

A receptacle or funnel 41 is carried by the bearings in a position to receive the powder as it flows from the measuring chamber 13 of the rotor. The upper cylindrical portion of the funnel is conveniently slotted to provide a pair of oppositely disposed turned back wings 42—42 which fit against the spaced bearings and are secured by screws 43. This arrangement also provides an opening 44 for the rotor as clearly shown in Fig. 1.

With the parts in the position shown in the drawing, powder from the hopper flows by gravity through the choke adapter 25 and fills the measuring chamber 13 in the rotor. The rotor is now turned through approximately 150 degrees cutting off the supply from the hopper and permitting the powder in chamber 13 to flow by gravity into the funnel 41 where it may flow into a suitable container. The time required to fill and empty the measuring chamber 13 is small so that the machine may be operated rapidly.

For charges of 30 grains avoirdupois, the machine will measure weights of powder to an accuracy of plus or minus .44 grain for 95 per cent of the charges. The accuracy for 100 per cent loadings will be within plus or minus .65 grain.

For charges of 100 grains avoirdupois, the machine has an accuracy of plus or minus 1.5 per cent. Larger charges can be measured by a larger machine with proportional accuracy.

We claim:

1. In a measuring machine, a support, a rotor trunnioned in the support and having a measuring chamber, a cut-off block mounted on the support and having an aperture, resilient means urging said block into contact with the rotor, an adapter with a funnel-shaped passage fixed at its upper portion in the block and disposed in the aperture thereof with its lower portion spaced laterally from the block to provide an annular air space and spaced vertically from the rotor, said block having an air vent in communication with the air space, and a hopper for supplying a material to the adapter and retaining the adapter in the block.

2. In a measuring machine, a support, a rotor trunnioned in the support and having a measuring chamber, a cut-off block having an aperture leading to said chamber and an air vent in its wall leading from said aperture, means for resiliently holding the block in contact with the rotor, an adapter fixedly carried by the block and disposed in the aperture thereof with its lower portion spaced laterally from the block and vertically from the rotor to provide an annular air space in communication with the air vent.

3. In a measuring machine, a support, a rotor trunnioned in the support and having a measuring chamber, upright pins on the support, a cut-off block slidably mounted on the pins and having a charging aperture leading to the measuring chamber of the rotor, and a spring on each pin engaging the block to hold it in engagement with the rotor.

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