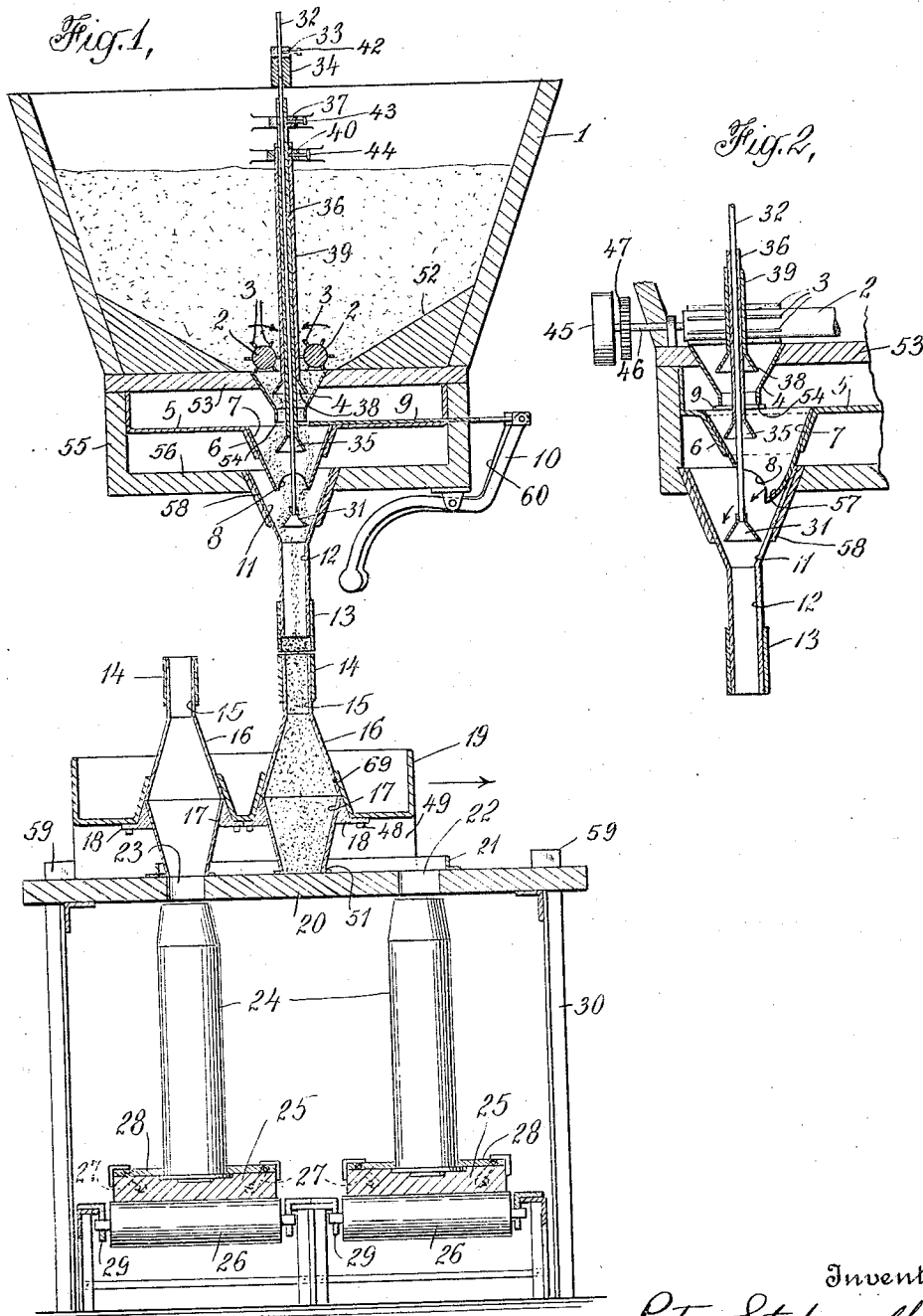


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 AUTOMATIC POWDER MEASURING DEVICE.
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AUTOMATIC POWDER-MEASURING DEVICE.

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To all whom it may concern:

Be it known that I, PETER STEPANOFF, a citizen of the Russian Republic, and resident of Petrograd, Russia, have made a certain new and useful Invention Relating to Automatic Powder-Measuring Devices, of which the following is a specification, taken in connection with the accompanying drawing, which forms part of the same.

10 This invention relates especially to automatic devices for measuring powder or other granular or finely divided material and is especially adapted for measuring powder charges for shell or ammunition loading.

15 The powder may be fed from a suitable hopper through a series of feeding funnels or devices by which its flow is regulated and the stream of powder is delivered through a series of discharge spouts into the reduced area receiving throat of each one of a series of measuring chambers, if desired. When this chamber is filled, the stream of powder banks up in the lower part of the delivery spout to a slight extent

20 until the other chambers of the series are filled, and then this series of filled chambers are bodily transferred from this loading position into a discharging position where the open lower ends come into line with discharge holes in the table or member through which they may allow the charge from each one of these measuring chambers to fall by gravity into the cartridge case or other receptacle below. This lateral movement of

25 the series of measuring chambers may be utilized to simultaneously bring another series of empty measuring chambers into alinement with the delivery spouts so that they can be filled while the first series is emptying; whereupon a reverse movement takes place and the second series of filled chambers is emptied. It is of course understood that any desired number of delivery spouts and related feeding devices may be

30 connected with a single hopper and a corresponding number of cartridge cases may be simultaneously filled and then removed and replaced by empty cases before another discharge occurs through this set of discharge holes or passages.

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In the accompanying drawing showing in a somewhat diagrammatic way an illustrative embodiment of this invention,

Figure 1 is a transverse vertical section, and

Fig. 2 is a partial longitudinal section through the feeding devices.

The hopper 1 may be of any suitable material and construction and may if desired have somewhat inclined sides as indicated, and inclined or hopped bottom members, 52 to guide the powder or other granular material toward the feeding devices. These may comprise a series of superimposed feeding funnels in which are preferably arranged one or more suitable distributing devices to regulate the stream of falling material and minimize packing thereof. A suitable arrangement is indicated in the drawing as comprising the upper or hopper funnel 4 which may have the cylindrical lower end 54 with which a cut off valve or gate 9 may cooperate to shut off the flow of material when desired. A separate gate is preferably arranged in connection with each set of feeding devices pivotally or otherwise connected with suitable valve arms 10, 60 so that each one of these sets of feeding devices may be more or less shut off when desired. It is usually desirable to have one or more lower funnels in each of these feeding devices, and if desired, a distributing funnel such as 7 may be employed and mounted within its supporting socket 6 in the partition 5 in a somewhat eccentric position, so as to have an increased distributing action. The falling material may thus be deflected against a somewhat curved guide bottom such as 57 so as to be laterally guided through the lateral feed opening 8 in this funnel and strike or impinge against the opposite side of the feeding device below, such for instance as the delivery funnel 11. This delivery funnel may be supported and if desired rigidly secured to the supporting socket 58 mounted in the lower support 56 which may be connected, as by the members 55 with the hopper bottom 53. The delivery funnel may be provided with a delivery spout such as 12 which may have a substantially cylindrical form and be provided in each case with an adjustable sleeve 13 sufficiently tight thereon to retain its position when manually adjusted from time to time.

It is sometimes desirable to promote the

feed of the powder or other material into the primary hopper funnel 4, by suitable agitators such as the agitator rolls 2 which may be mounted adjacent the funnel and simultaneously rotated as indicated by the arrows through the connecting gears 47 and drive pulley 45 on one of the roll shafts 46. These rolls may advantageously be formed with suitable projections or ribs 3 of rubber or other material, adjacent the hopper funnels so that the powder is agitated and its feed promoted by the relatively slow movement of these agitator devices. Although it is not necessary in all cases, it is sometimes desirable to have suitable control valves or members arranged within the superimposed funnels so that the rate of flow through one or more of the funnels of each series can be suitably regulated. For this purpose a control valve or bell 31 may be supported within the delivery funnel 11 by mounting the same on a depending stem 32 which may be carried up through the delivery hopper and supported in a guide 33 on the transverse brace 34 by tightening the adjusting nut or set screw 42 which clamps the control valve in adjusted position. One or more of the other funnels may have similar control valves or devices, such as the valve 35 which coöperates with the distributing funnel 7 and may be mounted on the tubular stem 36 supported in the guide 37 by the set screw 43. The valve 38 may, if desired, coöperate with the hopper funnel 4 and be mounted on a similar tubular stem 39 and supported in the guide member 40 by the thumbscrew or adjusting nut 44. This control valve may of course act as a cut off valve for the hopper funnel when it is lowered into substantial contact with the funnel so as to prevent further discharge therethrough.

Two series of measuring chambers of any suitable form and construction are preferably provided, one for each delivery spout and are mounted in supporting and guiding devices, so as to be removable with respect thereto and effect the alternate transfer of each measuring chamber from its filling position beneath the delivery spout to its discharging position in alinement with a discharge hole or passage communicating with a cartridge case for instance. A suitable arrangement is indicated in Fig. 1 as comprising two such measuring chambers 16, which may be removably mounted in chamber sockets 69, formed, if desired, in the tray 19 secured to the supporting guides 49. These guides may move over the table 20 between suitable stops such as 59, for example, so that each of the chambers is accurately transferred from its filling position beneath its delivery spout 12 to its discharge position above one of the discharge holes 22 or 23. These measuring chambers, may, if desired, be of the double

conical form indicated, the upper conical portion 16 fitting within the chamber socket 69 and being held in position as by a clamp 18 and bolts or screws 48. The lower conical portion 17 may have an open end and be so shaped as to insure complete delivery of material from the chamber so as to discharge all the material therefrom through one of the discharge holes, a rim flange 51 being provided if desired, at the lower end of the chamber so as to give better sliding contact with respect to the table 20 on which a rim 21 may be arranged if desired. These chambers may of course be interchangeable and considerable differences in the powder charges or other amounts of material measured may be taken care of by replacing one set of these measuring chambers with another of different shape and capacity. It is also desirable to have each of the chambers adjustable to some extent at least, and this may be conveniently effected by arranging an adjusting sleeve such as 14 in frictional engagement with the reduced area receiving throat 15 of the chamber so that by vertically adjusting this sleeve a corresponding slight adjustment in the chamber capacity is secured. Under these circumstances the adjusting sleeve 13 on the corresponding discharge spout is of course adjusted to a corresponding extent preferably so as to leave a considerable space such as one-tenth of an inch more or less between these coöperating sleeves, the thickness of which is of course exaggerated in the drawing.

The cartridge cases or other receptacles may be supported in any suitable way beneath the table 20 which may be mounted on legs such as 30. If desired, the number of cartridge cases, 24 which can be simultaneously filled by the series of emptying measuring chambers may be mounted on a single transfer block 25 and held in place by a cover 28 by means of the hooks or clamps 27, for instance. This block of cartridge cases may then be pushed along on the supporting devices such as the series of supporting rolls 26, mounted in the bearings 29 until the cartridge cases come into alinement with the series of discharge holes 22, for instance, then when the series of measuring chambers beneath the delivery spouts have been filled up to say about the points indicated in Fig. 1 the tray is moved in the direction of the arrow carrying both sets of chambers so that this filled set of chambers is brought over the discharge holes 22 and quickly emptied into the series of cartridge cases 24 below. This movement also brings the empty series of measuring chambers beneath the delivery spouts 12 so that they are thus brought into filling position. The slight accumulation of powder or other material within the delivery spouts above the upper ends of the receiving throats of the

filled measuring chambers naturally falls off into the tray 19 together with what little material falls from the spout during the repeated transfer movement of the measuring chambers, this material being of course removed from the tray continuously or intermittently by any suitable means such as discharge passages or hose connections so that it may be returned to the hopper or otherwise disposed of. For measuring ordinary grades of smokeless powder such as is used for the propelling charges of three inch shrapnel or similar shell, this measuring device gives very satisfactory results and on such charges the average variations under good service conditions need not be more than about one or two tenths of one per cent. of the weight of the powder charge. With one of these measuring devices having five delivery spouts a single workman can measure out about one thousand charges per hour with this exactness.

This invention has been described in connection with a number of illustrative embodiments, forms, proportions, parts, materials and arrangements, and methods of use, to the details of which disclosure the invention is not of course to be limited, since what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

I claim:

1. In powder measuring devices, a series of delivery spouts and cooperating feeding devices, adjusting sleeves on each of said delivery spouts, two series of measuring chambers each formed with an open bottom and with a reduced area receiving throat and an adjustable sleeve mounted thereon to cooperate with the corresponding delivery spout, a table below said delivery spouts and formed with discharge holes on each side of said delivery spouts, means to support a series of receptacles below said discharge holes and a support carrying said measuring chambers and movably mounted on said table to transfer one series of filled measuring chambers from their receiving position beneath said delivery spouts to their discharge position above said discharge holes and simultaneously transfer the other series of measuring chambers to their filling position.

2. In powder measuring devices, a series of delivery spouts, adjusting sleeves on each of said delivery spouts, two series of measuring chambers each formed with an open bottom and with a reduced area receiving throat and an adjustable sleeve mounted thereon to cooperate with the corresponding delivery spout, a table below said delivery spouts and a support carrying said measuring chambers and movably mounted on said table to transfer one series of filled measuring chambers from their receiving position

beneath said delivery spouts to their discharge position and simultaneously transfer the other series of measuring chambers to their filling position.

3. In powder measuring devices, a series of delivery spouts, two series of measuring chambers each formed with an open bottom and with a reduced area receiving throat to cooperate with the corresponding delivery spout, means to adjust the capacity of said measuring chambers, a table below said delivery spouts and a support carrying said measuring chambers and movably mounted on said table to transfer one series of filled measuring chambers from their receiving position beneath said delivery spouts to their discharge position and simultaneously transfer the other series of measuring chambers to their filling position.

4. In powder measuring devices, a series of delivery spouts, adjusting sleeves on each of said delivery spouts, two series of measuring chambers each formed with a reduced area receiving throat and an adjustable sleeve mounted thereon to cooperate with the corresponding delivery spout, and a movable support carrying said measuring chambers to transfer one series of filled measuring chambers from their receiving position beneath said delivery spouts to their discharge position and simultaneously transfer the other series of measuring chambers to their filling position.

5. In measuring devices, a series of delivery spouts, adjusting sleeves on each of said delivery spouts, and measuring chambers each formed with a reduced area receiving throat and an adjustable sleeve mounted thereon to cooperate with the corresponding delivery spout.

6. In powder measuring devices, a hopper and a communicating series of delivery spouts, a movable support mounted below said delivery spouts, a tray and two series of measuring chambers mounted on said support, each measuring chamber being formed with a reduced area receiving throat to cooperate with the corresponding delivery spout, a table on which said support and chambers are mounted and formed on each side of said delivery spouts with discharge holes into which said measuring chambers are adapted to discharge and means to support a series of cartridge cases or receptacles adjacent said discharge holes.

7. In measuring devices, a hopper and a communicating delivery spout, a movable support mounted below said delivery spout, two measuring chambers mounted on said support, each measuring chamber being formed with a reduced area receiving throat to cooperate with the corresponding delivery spout, a table on which said support and chambers are mounted and discharge holes into which said measuring chambers

are adapted to discharge and means to support a series of receptacles adjacent said discharge holes.

8. In measuring devices, a hopper and a communicating delivery spout, a movable support mounted below said delivery spout, a measuring chamber mounted on said support to cooperate with the corresponding delivery spout and a table on which said support and chamber are mounted.

9. In powder measuring devices, a delivery spout, an adjusting sleeve on said delivery spout, a movable support mounted below said delivery spout, two measuring chambers mounted on said support and each formed with a reduced area receiving throat and an adjustable sleeve mounted thereon to cooperate with said delivery spout, and means to support a series of receptacles to receive the material from said measuring chambers.

10. In powder measuring devices, a delivery spout, an adjusting sleeve on said delivery spout, a movable support mounted below said delivery spout, a measuring chamber mounted on said support and formed with a reduced area receiving throat and an adjustable sleeve mounted thereon to cooperate with said delivery spout, and means to support a series of receptacles to receive the material from said measuring chamber.

11. In powder measuring devices, a delivery spout, a movable support mounted below said delivery spout, a measuring chamber mounted on said support and formed with a reduced area receiving throat to cooperate with said delivery spout, means to adjust the capacity of said measuring chamber, and means to support a series of receptacles to receive the material from said measuring chamber.

12. In powder measuring devices, a hopper, a delivery spout communicating with said hopper, a movable measuring chamber having a reduced area receiving throat adapted to cooperate with said delivery spout in the filling position of the chamber and having a discharge opening at the lower end of the chamber adapted to cooperate with a discharge aperture in the discharge position of the chamber, a series of superimposed feeding funnels arranged between said hopper and said delivery spout and comprising a hopper funnel and a delivery funnel connected to said delivery spout and an intermediate distributing funnel having a curved guide bottom and a laterally arranged feed opening, a series of separately adjustable control valves arranged in said

funnels to regulate the flow of material therethrough and agitator rolls adjacent the receiving opening of said hopper funnel.

13. In powder measuring devices, a hopper, a delivery spout communicating with said hopper, a measuring chamber adapted to cooperate with said delivery spout in the filling of the chamber, a series of superimposed feeding funnels arranged between said hopper and said delivery spout and comprising a hopper funnel and a delivery funnel connected to said delivery spout and an intermediate distributing funnel having a curved guide bottom and a laterally arranged feed opening and a series of separately adjustable control valves arranged in said funnels to regulate the flow of material therethrough.

14. In powder measuring devices, a hopper, a delivery spout communicating with said hopper, a series of superimposed feeding funnels arranged between said hopper and said delivery spout and comprising a hopper funnel and a delivery funnel connected to said delivery spout and an intermediate distributing funnel having a curved guide bottom and a laterally arranged feed opening and an adjustable control valve arranged in said funnels to regulate the flow of material therethrough.

15. In powder measuring devices, a hopper, a delivery spout communicating with said hopper, a series of superimposed feeding funnels arranged between said hopper and said delivery spout and comprising an intermediate distributing funnel having a curved guide bottom and a laterally arranged feed opening to regulate the flow of material therethrough.

16. In powder measuring devices, a hopper, a delivery spout communicating with said hopper, a series of communicating feeding funnels arranged between said hopper and said delivery spout and comprising a hopper funnel and a delivery funnel connected to said delivery spout, and a series of separately adjustable control valves arranged in said funnels to regulate the flow of material therethrough.

17. In measuring devices, a hopper, a delivery spout communicating with said hopper, a series of communicating feeding funnels arranged between said hopper and said delivery spout and comprising a series of separately adjustable control valves arranged adjacent said funnels to regulate the flow of material therethrough.

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