Dec. 10, 1940. K. WASSÉN 2,224,204

SHELL INSPECTING MACHINE

Filed May 12, 1939 2 Sheets-Sheet 1

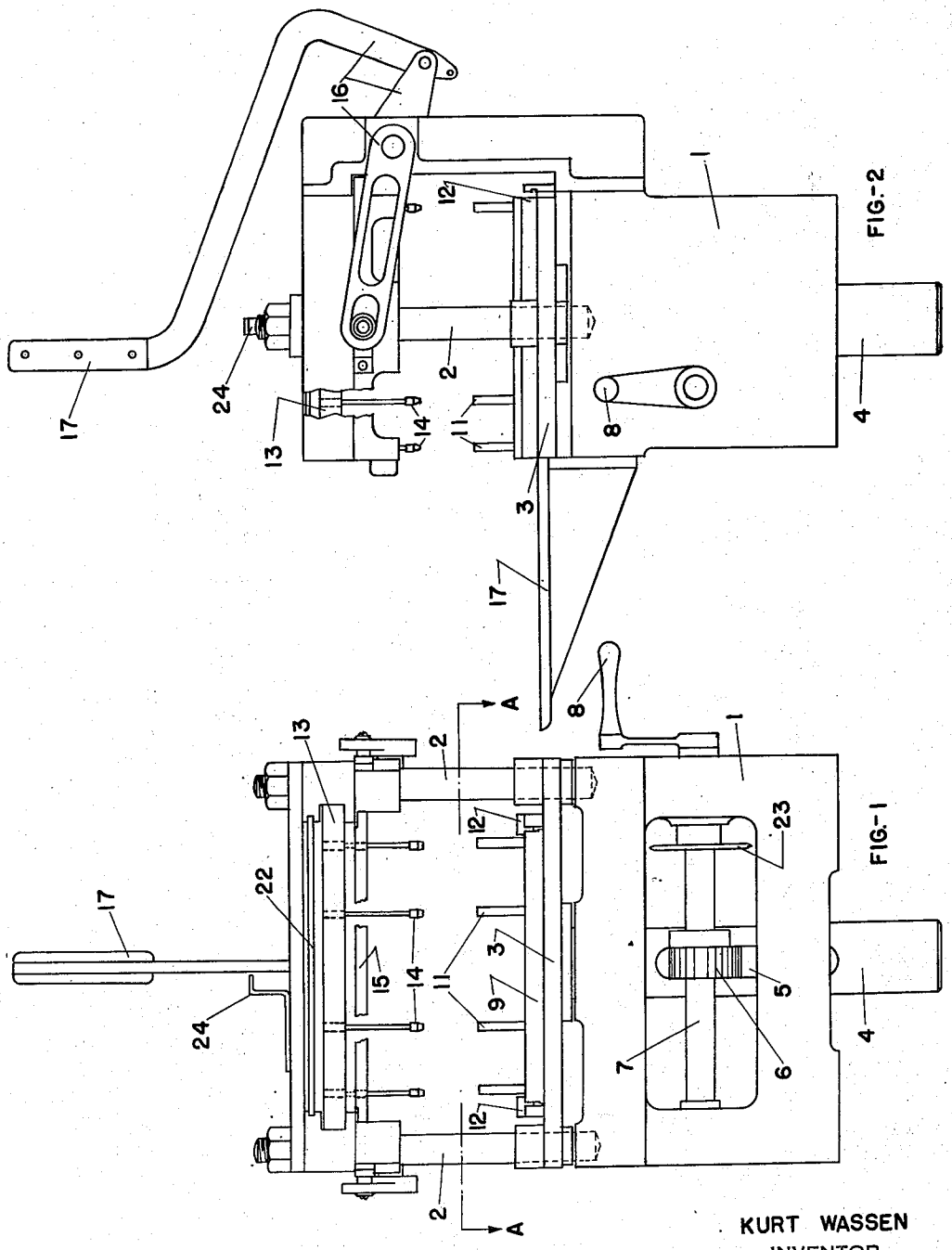


FIG. 2

FIG. 1

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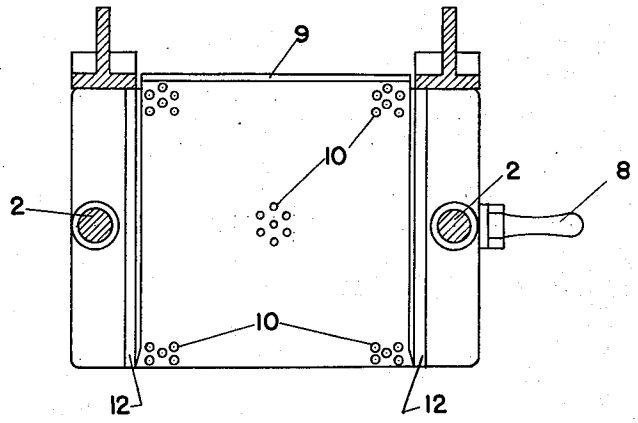


FIG.- 3

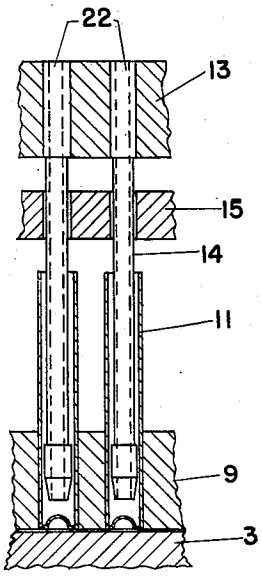


FIG.-4

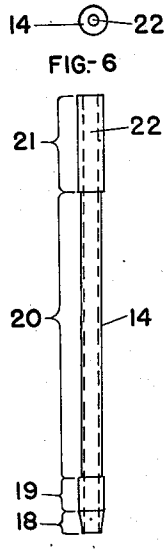


FIG.-6

FIG.-5

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2,224,204

UNITED STATES PATENT OFFICE

2,224,204

SHELL INSPECTING MACHINE

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Application May 12, 1939, Serial No. 273,302

3 Claims. (Cl. 209—82)

This invention relates to a semi-automatic inspection machine and more particularly to a machine for inspecting blasting cap shells that is designed to reject all imperfect shells.

In the explosive industry it is of the utmost importance to have all metal parts used in a process thoroughly inspected and approved. The inspection of these parts constitutes the best protection from disastrous accidents, which may be caused from a machine jamming or from friction developing. Accidents in the explosive industry must be prevented because such accidents cause untold damages and may seriously endanger the lives of the workers.

In the manufacture of blasting caps the need of extreme care while inspecting parts entering a process is especially apparent because of the extremely sensitive nature of the detonating explosives used. Further, the process of manufacturing blasting caps calls for the pressing of explosives into metal shells which is obviously delicate work. The use of inspected shells makes the pressing operation safer by eliminating the possibility of all irregularities which may tend to cause a localized increase in pressure or to create undue friction between press pins and shells.

Blasting cap shells, as is well known by the art, usually are between .22 inch and .30 inch in diameter and from 1½ inches to 6 inches in length. It is therefore evident that the processing of explosives in conjunction with such small containers is extremely exacting and that the containers must be kept within rigid specification limits as to diameter and length by thorough inspection.

It is the object of this invention to provide a machine for accurately inspecting all sizes of blasting cap shells mechanically. A further object of this invention is to inspect these shells mechanically in such a manner that even the slightest irregularity of the shell is noted and the shell rejected. A still further object of this invention is to obtain this accurate inspection efficiently, economically, and in a semi-automatic mechanical manner. Further objects will be apparent hereinafter.

The objects of this invention are accomplished by a machine which operates semi-automatically and which efficiently removes all imperfect shells. Broadly the machine of this invention may be described as comprising means hereinafter called the shell block for holding a blasting cap shell in a predetermined position and means for inserting into the shell a hollow inspection pin of definite diameter. The inspection pin closely fits into a perfect shell but a perfect shell will easily slide off the pin, while, due to friction, any imperfect shell that the inspection pin is inserted into will adhere to the pin. By the removal of those shells which adhere to the inspection pins, an efficient separation of perfect and imperfect shells may be easily made. The possibility of large shells passing this type inspection is not serious as the shells of slightly large diameter would never cause a machine to jam. Excessively large shells of course will not fit into the shell block.

Having now indicated in a general way the nature and purpose of this invention, there follows a more detailed description of preferred embodiments thereof with reference to the accompanying drawings in which:

Figure I is a front elevation view of the shell inspection machine; Figure II is a side elevation of the machine; Figure III is a plan view of the machine taken along line AA of Figure I; Figure IV is an elevation view of two blasting caps with testing die pins inserted therein; Figure V is an elevation view of a testing die pin of the machine; and Figure VI is an end view of the die pin shown in Figure V.

A detailed description of the design and means of operating the machine of this invention with reference to Figures I, II, and III in which like numerals refer to like parts follows:

The machine is mounted on a substantial base 1 from which extending upward are two supports 2 located centrally on each side of the base 1. These two supports 2 carry the upper members of the machine and also act as guides for the movable parts of the machine.

On the base 1 is positioned a movable base plate 3 to which is attached a cylindrical shaft 4 that has on its surface a gear rack 5 that meshes with a gear 6 located on the horizontal shaft 7 that has on one end a handle 8 with which the horizontal shaft 7 may be rotated. The rotation of the horizontal shaft 7 through about 180° by the handle 8 causes the base plate 3 to rise a predetermined height.

Upon the base plate 3 is placed an independent shell block 9 which contains a plurality of holes 10 drilled to accommodate any predetermined definite type and number of shells 11. The shells 11 inserted into the holes 10 of the shell block 9 align themselves due to the action of the guides 12 in such a way under the pin block 13 containing separate pins 14 for each of the shells 11, that upon raising the base block 3 by the use of the gear 6 and gear rack 5 the

shells 11 rise, and are each entered by its corresponding pin 14. The machine therefore is designed to raise the shells so that each shell is slipped onto a pin which will extend to the bottom of the shell. After the operation of raising the base plate, the base plate is lowered and the perfect shells slip off the pins thus completing the inspection. All shells which are not perfect will remain adhering to their respective pin and these imperfect shells are subsequently discarded by the action of lowering the stripper plate 15 with the combination of levers 16 actuated by moving the handle 17. Before stripping the imperfect shells from the pins, the block of perfect shells is removed from under the pin head 13 and taken from the inspection machine via platform 17.

The stripper plate 15 which removes the imperfect shells from the pins is positioned closely below the pin head 13 and thus provides as much clearance as practical and prevents excessive pin length. The pins in themselves must of course be of sufficient length to reach to the bottom of the shells being inspected which may necessitate pins of various lengths. To insure the removal of the imperfect shells from the pins the stripper plate must therefore be so geared that the movement of the handle will force the plate substantially to the bottom of the pins.

Although I have described above a means of raising the base plate so that shells are slipped onto the pins, it will be understood that the machine of this invention may be designed to operate by lowering the pins into the shells.

The operation of the machine of this invention is further illustrated by Figure IV which shows in cross section an assembly view of the inspection pins 14 and shells 11 when the base plate 3 has been raised. Thus, from Figure IV it is noted that the inspection pins 14, which are pressed into the pin plate 13, enter the shells 11 and extend substantially to the bottom of the shells 11 thus providing a complete and accurate means of inspecting the internal shell walls. If a shell has any dents, small irregularities, or is oval shaped, the pin will not withdraw and the shell will be lifted from the shell block and removed as imperfect.

The pins 14 are designed as shown in Figures V and VI with a short tapered end 18 to facilitate the ease of entering the shell to be inspected, and then with a perpendicular section 19 which is ground to a definite diameter, and highly polished or lapped to do the inspection work. The shank 20 is of necessary length to allow the insertion of the inspection section into the bottom of the shell and may be of various lengths depending upon the different type shells to be inspected. The enlarged section 21 at the top of the pin is designed to give a press fit into the pin block. A hole 22 extends entirely through the pin to prevent shells from adhering to the pin due to the vacuum that would be created if such a hole was not present.

The design and preparation of the inspection pins of the inspection machine of this invention are of the utmost importance. While I have found that these pins may be produced by highly polishing or lapping a steel pin, I prefer first to chromium plate the pins and then grind or lap the inspection surface to the desired diameter. This polished chromium surface, I have found, gives a more accurate and efficient inspection, the pins removing all imperfect shells while all perfect shells slip easily from the pin back into the block as perfect shells. Further, due to the extreme hardness of the chromium plated surface, the wearing quality is improved and consequently the retention of high inspection ability is prolonged.

The degree to which the inspection is to be carried depends entirely upon the inspection pins' outside diameters' relation to the inside diameter of the shell to be inspected. Thus, the inspection pins may be made to give any clearance when inserted into the shells and such clearance determines the degree of imperfection noted. I have found that when .22 caliber shells are to be inspected, the use of a pin having about a .218 inch diameter inspecting surface removes all shells which would be apt to cause any trouble when loaded with explosives. The relation of the pin diameter and shell diameter is therefore the controlling factor in obtaining perfect shells and the degree to which the inspection is to be carried depends thereon.

It will be obvious that the various diameter shells will require different diameter inspection pins and therefore it is to be understood that I contemplate using the machine of this invention to inspect shells of any diameter or length by substituting inspection pins of the desired diameter and length and, if necessary, increasing or decreasing the length of stroke of the base plate provided for by the gear rack.

There are many features which may be added to the machine of this invention and which are to be understood to be within the broad scope of this invention that may tend to give easier operation. Thus, to illustrate there may be provided a metal plate or safety glass guard 22, Figure I, to prevent dirt or foreign substance from entering the holes in the individual pins. Another aid in operation may be a sprocket 23 Figure I over which may act a counter weight to ease the action of the base plate. Likewise it has been found desirable to add a locking device 24 Figure I to prevent any motion of the stripper plate during the actual inspecting of the shells. Further similar improvements should be considered as within the broad scope of this invention.

The number of holes in the shell block will, of course, correspond to the number of pins in the pin head and may be any number that provides an efficient inspection. Thus, I prefer to use a shell block which has the same number and arrangement of shells that are used during the explosives pressing operation as such use allows the block of inspected shells to be taken directly to the explosives press.

Although the machine of this invention is specifically designed to inspect blasting caps, it may also be adapted for use in inspecting other shells such as rifle cartridges, metal capsules, tubes, nipples, barrels, and the like.

It will be understood that the details and examples given hereinbefore are illustrative only and in no way limiting on my invention as broadly described hereinbefore and in the appended claims.

What I claim and desire to protect by Letters Patent is:

1. In a machine for inspection the inner bore of tubular members such as blasting cap shells, the combination of a holder having means for receiving tubular members adapted to be inspected, a block supporting a plurality of cylindrical inspecting members above the tubular members in said holder, said inspecting mem-

bers having a diameter closely approximating the bore of the tubular members being inspected, means for moving said block and said holder relative to each other to cause said inspecting members to enter said tubular members whereby any defect in any tubular member causes contact with an inspecting member and adherence to said inspecting member, and means for removing said adhering defective members from said inspecting member.

2. In a machine for inspecting the inner bore of closed end shells, the combination of a holder having means for receiving shells adapted to be inspected, a block supporting a plurality of cylindrical inspecting pins above the shells in said holder, said inspecting pins having a diameter closely approximating the bore of the shells being inspected, means for moving said block and said holder relative to each other to cause said inspecting pins to enter said shells whereby any defect in any shell causes contact with an inspecting pin and adherence to said inspecting pin, and means for removing said adhering defective shells from said inspecting pins.

3. In a machine for inspecting the inner bore of closed end shells, the combination of a holder having means for receiving shells adapted to be inspected, a block supporting a plurality of cylindrical inspecting pins above the shells in said holder, said inspecting pins having a diameter closely approximating the bore of the shells being inspected and having a duct between the ends thereof adapted to vent to the atmosphere the interior of the shell to be inspected when said pin is entered into said shell, means for moving said block and said holder relative to each other to cause said inspecting pins to enter said shells whereby any defect in any shell causes contact with an inspecting pin and adherence to said inspecting pin, and means for removing said adhering defective shells from said inspecting pins.

KURT WASSÉN.