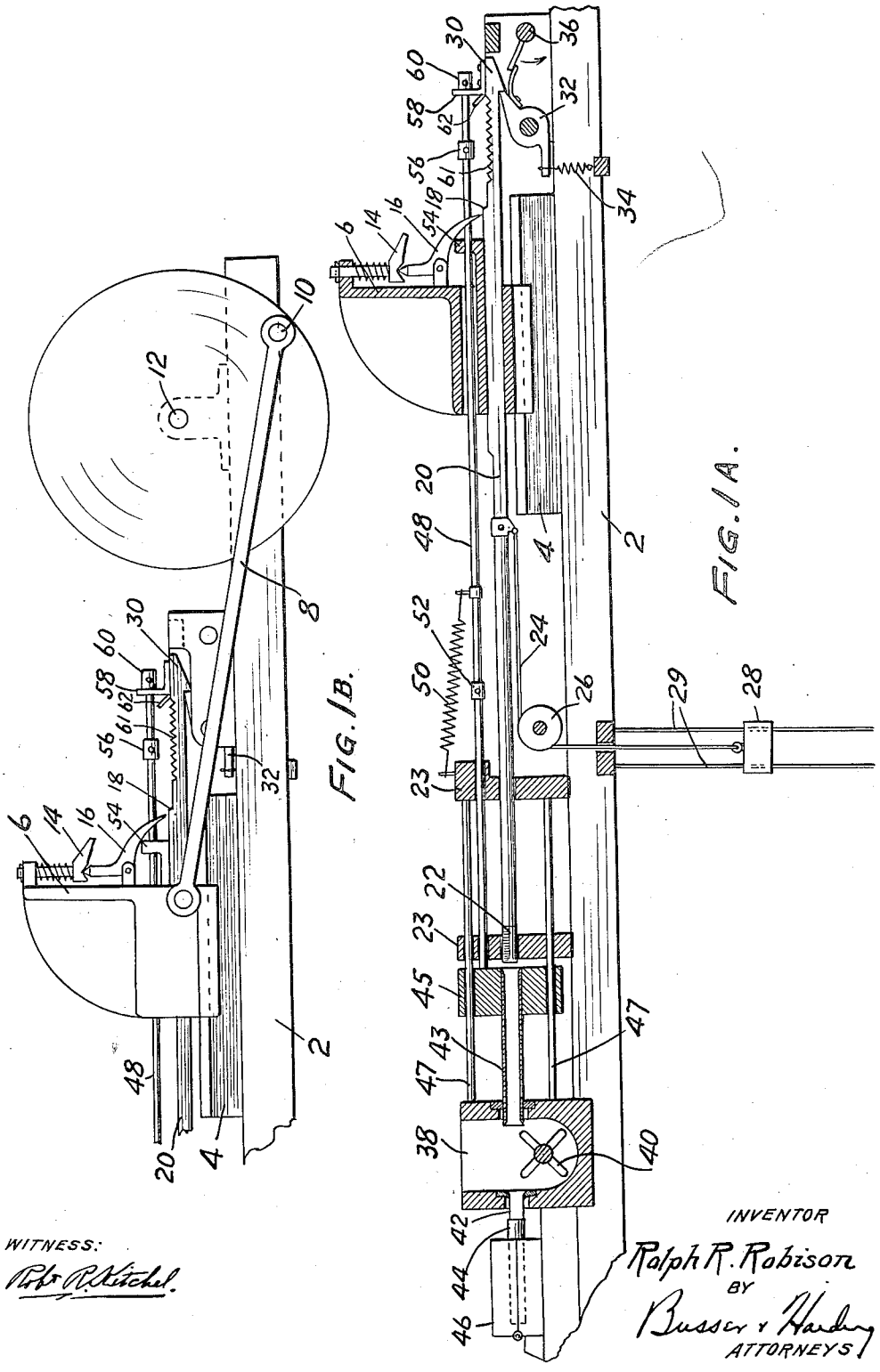
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Oct. 26, 1937. R. R. ROBISON 2,097,080

SHELL FILLING MACHINE

Filed Sept. 25, 1933 2 Sheets-Sheet 1



WITNESS:

INVENTOR
Ralph R. Robison
BY
Bussey & Harding
ATTORNEYS

60. AMMUNITION & EXPLOSIVE
CHARGE MAKING
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Search Room

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SHELL FILLING MACHINE

Filed Sept. 25, 1933 2 Sheets-Sheet 2

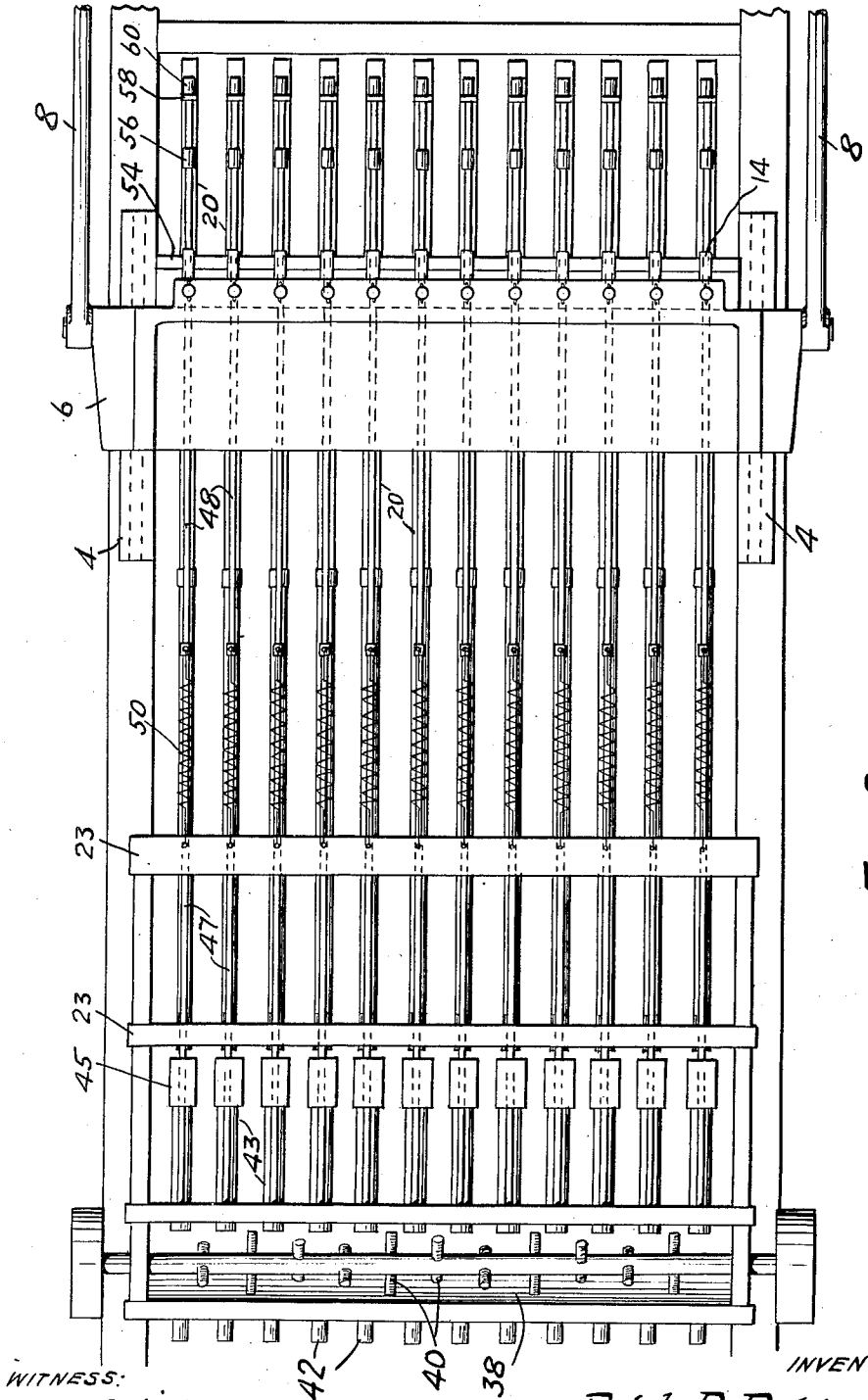


FIG. 2.

WITNESS:
Robt. R. Kitchel.

INVENTOR
Ralph R. Robison
BY
Bacon & Harding
ATTORNEYS.

CHARGE MAKING

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Patented Oct. 26, 1937

2,097,080

UNITED STATES PATENT OFFICE

2,097,080

SHELL FILLING MACHINE

Ralph R. Robison, Hercules, Calif., assignor to Hercules Powder Company, Wilmington, Del., a corporation of Delaware

Application September 25, 1933, Serial No. 690,839

3 Claims. (Cl. 86—20)

This invention relates to a machine for packing explosive material in shells or cartridges and more specifically relates to a machine which will effect such packing more rapidly than machines heretofore used.

In the patent to Kimber 813,435, dated February 27, 1906, there is illustrated a cartridge loading machine to which the machine of the present invention bears a considerable resemblance in its general construction and mode of operation. Machines of the Kimber type have been widely used and have been found to be very satisfactory in the filling of shells. Essentially they involve plungers which pass through a supply trough of a fibrous, non-free flowing explosive material, such as dynamite, and carry a certain amount of it within the shell, tamping it therein. In general, the amount of dynamite carried into a shell on each stroke is relatively small and the operation of packing is accordingly prolonged.

It is the broad object of the present invention to provide means for insuring the entry of a larger amount of explosive material within a shell upon each stroke of its tamping rod to thereby speed up the packing operation but, nevertheless, effect such operation in a satisfactory manner, producing the proper compacting of the explosive within the shell.

The above and other objects relating to details of construction will be apparent from the following description read in conjunction with the accompanying drawings in which:

Fig. 1A is a vertical section through a portion of the improved machine showing the parts associated to pack a single shell;

Fig. 1B is an elevation showing certain of the operating parts; and

Fig. 2 is a plan view of the major portion of the machine.

Upon a sloping frame **2** there are supported tracks **4** on which there slides a crosshead **6** driven by links **8** connected to crankpins **10** carried by a power driven shaft **12**. The crosshead **6** is provided with a plurality of fingers **16** adapted to engage with racks **61** on a corresponding number of flattened tamping rods **20**. The fingers **16** may be held out of engagement with the racks **61** by means of spring catches **14**, but even in this position they will engage stops **62** carried on the tamping rods **20**. The rods **20** are suitably guided through the crosshead **6** and also through a cross member **23**.

Attached to each tamping rod is a cord **24** passing over a pulley **26** and supporting at its end a weight **28** guided by vertical rods **29**. At the rear end of each tamping rod there is a hook **30** arranged to be engaged by a tooth of a pawl **32** which is pivoted on a shaft and held in position to cause it to engage the hook by means of a spring **34**. It may be dislodged from such position against the tension of spring **34** by manipulation of a shaft **36** carrying a finger engaging each pawl.

At the lower end of the machine there is provided a sloping transverse hopper **38** through which there extends a stirrer **40** designed to be rotated to prevent the explosive material from packing in the trough and also uniformly distribute it in front of the tamping rods. Extending outwardly from the trough in line with each of the tamping rods there is provided a nipple **42** which receives the open end of a shell **44** held in a carrier **46**. There is also aligned with each of the tamping rods **20** a fibre nipple **43**, these nipples **43** being carried by individual crossheads **45** which are guided on horizontal rods **47**. Each of the crossheads is connected to a rod **48** which is urged forwardly by a spring **50** towards its extreme position which is determined by the engagement of a collar **52** with the fixed member **23**. The rods **48** pass through openings within an extension **54** of the crosshead **6** and are provided with stop collars **56** arranged to be engaged by **54**. The rods also pass through an upwardly extending member **58** carried by each corresponding tamping rod and are provided with collars **60** arranged to be engaged by the various members **58**. The members **58** engage collars **60** but are arranged to clear collars **56**.

When the machine is to be operated shells **44** are placed in position over the ends of the nipples **42**, being held in the shell holder **46**. If the parts are in the position illustrated in Fig. 1A, irrespective of rotation of the shaft **12** and movements of the crosshead **6** no tamping action will occur. The tamping action may be started by disengaging detents **32** from the hooks **30** of the tamping rods. The tamping rods are then moved forwardly through the action of the weights **28**. As the tamping rods move forwardly the nipples **43** also move forwardly under the action of the springs **50** until the collars **52** engage the member **23** at which time the forward ends of the nipples just clear the plate which supports the fixed nipples **42**. During such forward movement they will, of course, entrap a considerable quantity of the explosive within the hopper **38**. Up to this point they have moved in unison with the tamping rods. Following this, however, the tamping rods continue to move forwardly inde-

pendently of the nipples and drive the powder from the nipples into the shells. In this tamping action the rods 20 move forward until the explosive material in their individual shells is fully compacted by reason of the inertia of the weight 28.

As the crosshead moves rearwardly the fingers 16 engage with stops 62 on the rods 20, and are by this engagement disengaged from spring catches 14. The rods 20 are thus moved rearwardly by the crosshead. In this retracting stroke, if the shells have not been filled, as of course will be true even after several strokes, the tamping rods 20 will not be retracted enough to cause engagement of their hooks with the pawls 32. The movable nipples 43, however, will be fully retracted by engagement of the stops 56 by the crosshead extension 54.

Upon the next forward stroke of the crosshead the nipples 43 and the tamps 22 will again move forward and pack more explosive material into the shell 44. However, the forward motion of tamp 22 and rod 20 will be limited by the powder in the shell, and the crosshead will move on forward in relation to rods 20 causing the fingers 16 to slip and engage in more forwardly located notches in racks 61. The rearward stroke of the crosshead will then retract the tamps 22 and nipples 43.

This cycle will continue with each finger 16 taking a position in the rack 61 on the corresponding tamping rod 20 determined by the amount of explosive in the shell served by that rod, and so causing the tamping rod to be retracted farther and farther on each rearward stroke of the crosshead 6, until, when the shell is filled with explosive, the rod will be sufficiently retracted to cause the hook 30 to engage with the corresponding pawl 32. The following forward stroke of the crosshead 6 will cause finger 16 to engage cam 18 on the tamping rod 20 and so become engaged again with spring catch 14. Thereafter, further movements of the crosshead will not effect tamping strokes of this tamping rod. At the same time the collar 60, engaged by the upturned member 58, holds the movable nipple 43 corresponding to the inactive tamping rod so as to prevent its advance through the explosive material.

It will be obvious from the above that the filling of the shells will take place more quickly in the machines heretofore used inasmuch as a substantially greater amount of explosive is introduced upon each reciprocation. This is due to the fact that in its forward stroke each nipple 43 entraps a considerable amount of the explosive which is forced into a shell with very little loss.

The filling of the shells to a predetermined degree is insured in an obvious fashion inasmuch as the motion of a tamping rod will not cease until its rearward stroke will cause it to be engaged by its corresponding pawl 32.

It will be clear that various changes may be made in details of the invention without departing from the scope thereof as defined in the following claims.

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

1. Apparatus for packing non-free flowing explosive material in shells, comprising a container for the explosive material having a plurality of discharge openings therein, means for supporting shells to be filled in direct communication with said container through said discharge openings, a plurality of open-ended tubes arranged in line with said discharge openings and extending into said container, means constantly urging said tubes forward through the explosive material in said container toward said discharge openings, a plurality of tamping rods carrying tamps of sufficiently small diameter to pass entirely through said tubes and said discharge openings into said shells arranged in line with said tubes and said discharge openings, means secured to said tamp rods for reciprocating said tamps, and means adapted to retract said tubes against said forwardly urging means on each rearward stroke of said rods, whereby on each forward stroke of said rods the said tubes move forwardly to segregate a portion of said explosive material in the container directly in front of said discharge openings, which portion is packed into the shells by the action of the tamps.

2. Apparatus for packing non-free flowing explosive material in shells, comprising a container for the explosive material having a plurality of discharge openings therein, means for supporting shells to be filled in direct communication with said container through said discharge openings, a plurality of open-ended tubes arranged in line with said discharge openings and extending into said container, means constantly urging said tubes forward through the explosive material in said container toward said discharge openings, a plurality of tamping rods carrying tamps of sufficiently small diameter to pass entirely through said tubes and said discharge openings into said shells arranged in line with said tubes and said discharge openings, means for reciprocating said tamping rods, and means secured to said tamping rods adapted to retract said tubes against said forwardly urging means on each rearward stroke of said rods and to prevent forward motion of said tubes except during forward motion of said rods, whereby on each forward stroke of said rods the said tubes move forwardly to segregate a portion of said explosive material in the container directly in front of said discharge openings, which portion is packed into the shells by the action of the tamps.

3. Apparatus for packing non-free flowing explosive material in shells, comprising a container for the explosive material having a plurality of discharge openings therein, means for supporting shells to be filled in direct communication with said container through said discharge openings, a plurality of open-ended tubes arranged in line with said discharge openings and extending into said container, means constantly urging said tubes forward through the explosive material in said container toward said discharge openings, a plurality of tamping rods carrying tamps of sufficiently small diameter to pass entirely through said tubes and said discharge openings into said shells arranged in line with said tubes and said discharge openings, means for reciprocating said tamping rods, means secured to said tamping rods adapted to retract said tubes against said forwardly urging means on each rearward stroke of said rods and to prevent forward motion of said tubes except during forward motion of said rods, and means for locking individual tamping rods and tubes against further movement and in their rearmost position when the corresponding shell is filled, whereby on each forward stroke of said rods the said tubes move forwardly to segregate a portion of said explosive material in the container directly in front of said discharge openings, which portion is packed into the shells by the action of the tamps.

RALPH R. ROBISON.

86-20

CERTIFICATE OF CORRECTION.

Patent No. 2,097,080. October 26, 1937.

RALPH R. ROBISON.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 21, strike out the word "material"; line 24, for "powder" read explosive material; and second column, lines 8 and 9, claim 1, strike out "secured to said tamp rods" and insert the same after "means", line 9, same claim; line 9, same claim 1, for "tamps" read tamping rods; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 7th day of December, A. D. 1937.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

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