(No Model.) 6 Sheets—Sheet 1.

J. R. HASKELL.

Accelerating Gun.

No. 241,978. Patented May 24, 1881.

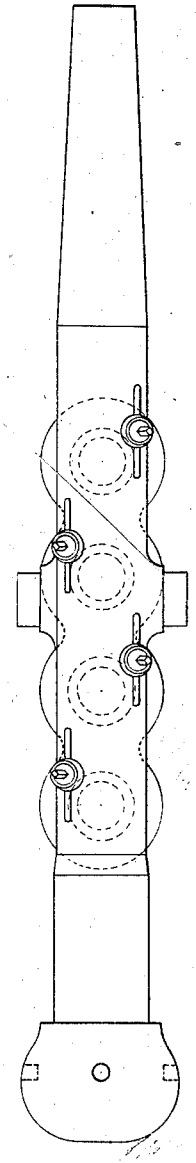


FIG. 1.

WITNESSES.

Thos. Broadway

Francis Broadway

INVENTOR.

James R. Haskell

(No Model.) 6 Sheets—Sheet 2.

J. R. HASKELL.

Accelerating Gun.

No. 241,978. Patented May 24, 1881.

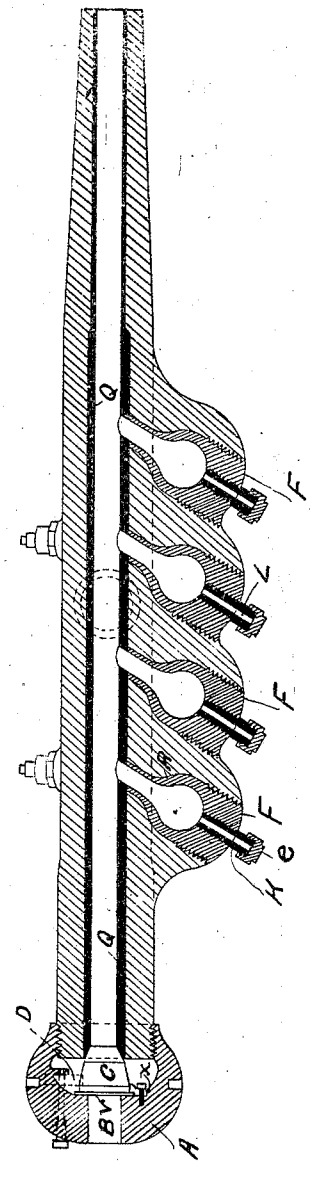


FIG. 2.

WITNESSES.

Francis Broadnax.

Francis Broadnax.

INVENTOR.

James R. Haskell

(No Model.) 6 Sheets—Sheet 3.

J. R. HASKELL.

Accelerating Gun.

No. 241,978. Patented May 24, 1881.

FIG. 4.

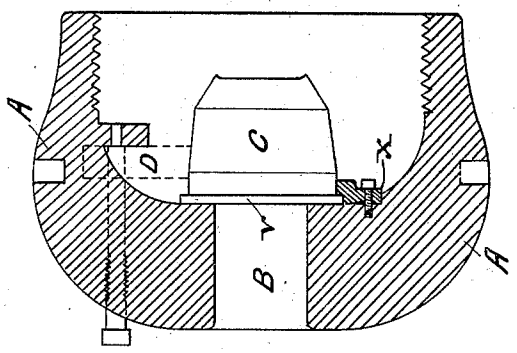
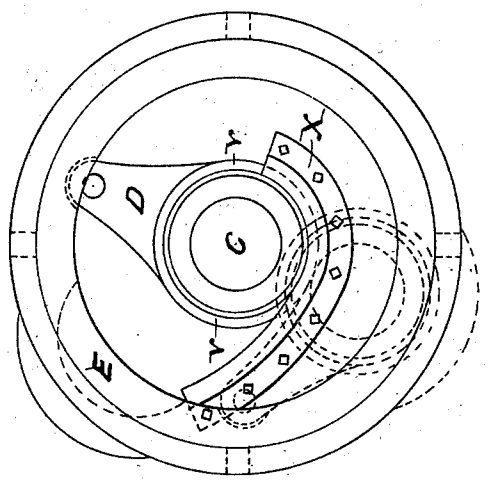


FIG. 3.



WITNESSES.

Amos Broadwell

Francis Broadwell

INVENTOR.

James R. Haskell

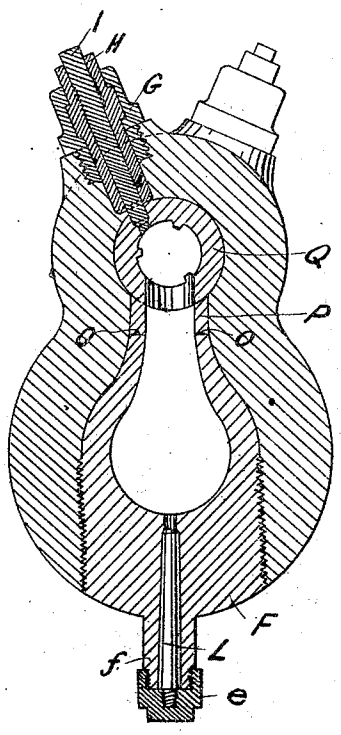
(No Model.) 6 Sheets—Sheet 4.

J. R. HASKELL.

Accelerating Gun.

No. 241,978. Patented May 24, 1881.

FIG. 5.



WITNESSES.

Amor Broadnax

Francis Broadnax.

INVENTOR

Jam s. R Haskell

(No Model.) 6 Sheets—Sheet 5.

J. R. HASKELL.

Accelerating Gun.

No. 241,978. Patented May 24, 1881.

FIG. 7.

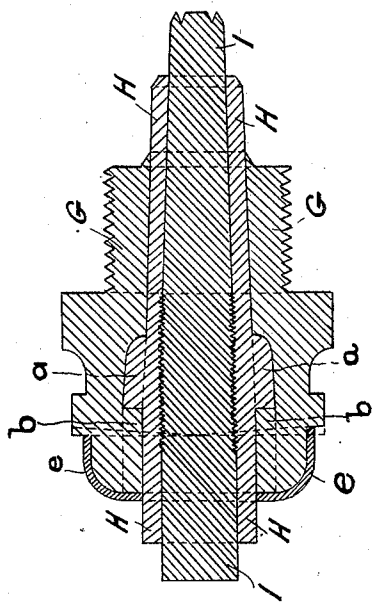
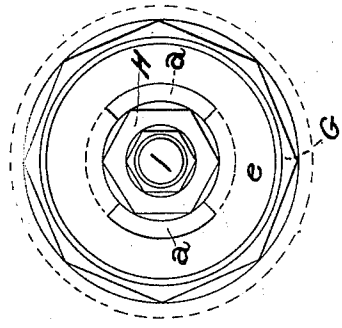


FIG. 6.



WITNESSES.

C. Amor Broadway

Francis Broadway

INVENTOR.

James R. Haskell

(No Model.)

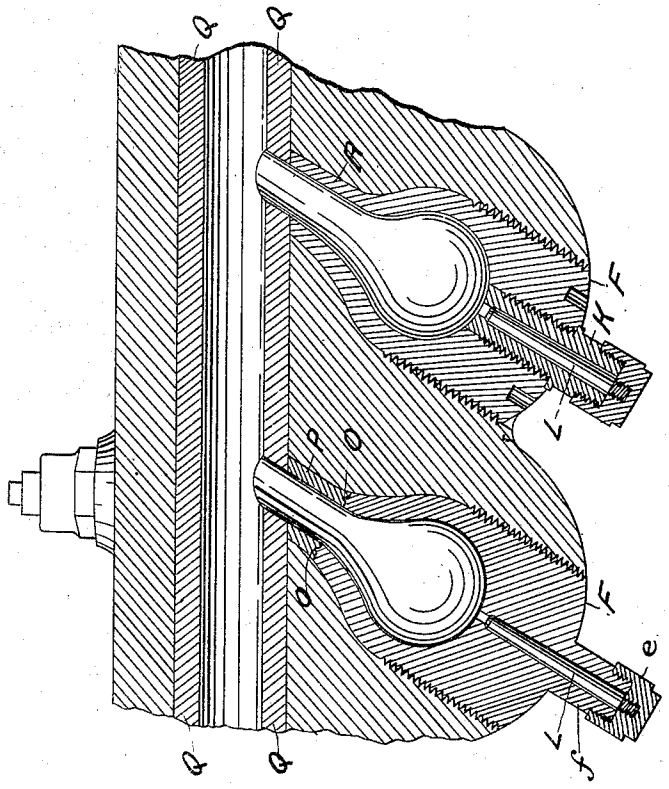
6 Sheets—Sheet 6.

J. R. HASKELL.

Accelerating Gun.

No. 241,978. Patented May 24, 1881.

FIG. 8.



WITNESSES.

Anna Broadnax

Francis Broadnax.

INVENTOR.

James. R. Haskell

UNITED STATES PATENT OFFICE.

JAMES R. HASKELL, OF PASSAIC, NEW JERSEY, ASSIGNOR TO ARTHUR B. JOHNSON, TRUSTEE, OF UTICA, NEW YORK.

ACCELERATING-GUN.

SPECIFICATION forming part of Letters Patent No. 241,978, dated May 24, 1881.

Application filed October 28, 1880. (No model.)

To all whom it may concern:

Be it known that I, JAMES R. HASKELL, of Passaic, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Accelerating-Guns, of which the following is a description in such full, clear, exact, and concise terms as to enable any one skilled in the art to which it appertains, or with which it is most nearly connected, to make and use the same, reference being had to the accompanying drawings, making part of this specification, and to the figures and letters of reference marked thereon.

On February 3, 1857, Letters Patent of the United States were granted to Azel Storrs Lyman for an accelerating-gun.

The leading principles embodied in the gun for which the said patent was granted consists of the accumulation of power behind the projectile by the successive explosions of supplemental charges of powder after the explosion of the initial charge and during the progress of the shot out of the gun, said supplemental charges of powder being contained in separate branches or barrels of the gun, communicating with its main or central bore.

The patent aforesaid embraces also the idea and describes a means of exhausting the air from before the shot in the gun after charging it; but to this feature of the invention my improvements have no relevancy.

On February 26, 1878, Letters Patent of the United States were granted to said Lyman for certain improvements upon said accelerating-gun.

The improvements for which the last-mentioned patent was granted consisted substantially, first, of an enlargement made upon one side of the rear portion of the gun, and of making the supplemental-charge chambers in said enlargement, instead of in separate barrels or branches, as in the patent of February 3, 1857; secondly, of constricting the muzzle end and of enlarging the breech end of said supplemental-charge chambers, to increase their capacity and at the same time decrease the size of their throats—openings in the bore of the gun; thirdly, of arranging all of the supplemental charge chambers successively in advance of each other in said enlargement on the under side of the gun, and of providing each chamber with an opening and a breech-pin, by which it can be cleaned from the bottom, and a priming hole and pin by which it can be charged from the top. These are the essential principles of the gun as embodied in the aforesaid patents to the original inventor, Lyman.

Now, the invention that makes the subject-matter of this application are improvements upon the gun as it appears in the aforesaid patent of February 26, 1878.

My improvements consist, first, of an improved cap and plug for the main breech of the gun; secondly, of supplemental-charge chambers made of separate pieces of steel or other suitable metal and screwed into the enlargement made on the under side of the gun; thirdly, of an improved priming or charging plug for said supplemental-charge chambers; fourthly, of an improved provision for lining, boring, and cleaning the supplemental-charge chambers; fifthly, of a lining of steel in the barrel or bore of the gun, in combination with steel supplemental-charge chambers or supplemental-charge chambers lined with steel; and, sixthly, of combining in the breech of the gun a charge of slow-burning powder with a separate charge of quick-burning powder in each of the supplemental-charge chambers, by which a light initial pressure is obtained, followed by a rapid accumulation of pressure behind the shot from the explosion of a succession of quick-burning charges in the supplemental-charge chambers.

Reference being had to the drawings, Figure 1 is a top view of the gun, and Fig. 2 is a longitudinal vertical section through the same with my improvements applied thereto. Fig. 3 is an interior view of my improved breech-cap, showing a plan of the breech-plug. Fig. 4 is a longitudinal section through the same. Fig. 5 is a cross-section through the gun and supplemental-charge chambers. Fig. 6 is a plan, and Fig. 7 a longitudinal section, through my improved priming-plug, on an enlarged scale; and Fig. 8 is a longitudinal vertical section through two of the supplemental-charge chambers, upon an enlarged scale.

The object of the first of my said improve-

ments is to provide a more ready, simple, and effectual method of closing the breech of the gun, and at the same time offer the utmost facility for charging and cleaning it. This object is accomplished by means of a breech-cap consisting, substantially, of a metal cap, in the bottom of which a hole is made a little larger than the bore of the gun, and through which the cartridge and shot are introduced into the gun. This cap is shown by A, and the hole in its bottom by B. In the inside of the flange of this cap a screw-thread is cut to screw into a like thread cut on the breech in the manner shown by Fig. 2. The breech of the gun is thus embraced by a metal cap having a hole in its center, through which the charge is introduced into the gun. Now, to close the bore of the breech, I fit a breech-plug, *c*, in the bottom of the cap and secure it there by means of an arm, D, bolted to the cap, the plug swinging by the arm about the bolt as a pivot, so that the plug turns with the cap and travels laterally to and fro with it. Thus, when the plug is in the position shown by the drawings, it covers the hole in the bottom of the cap and closes the breech of the gun; but when the cap is screwed back the breech-plug follows it and drops down into the side of the cap, as shown in dotted lines, there being a recess, E, cut in the side of the cap to receive the breech-plug, which, though it is pivoted by the arm D to the bottom of the cap, is, nevertheless, free to fall into the recess clear of the bore of the gun and the hole in the bottom of the cap; and the position of the arm that secures the breech-plug in the bottom of the cap, with reference to the lateral motion of the cap on the breech of the gun, is such that in screwing the cap forward the breech-plug automatically takes its seat into the bore of the gun. To draw the plug back out of its seat in the breech of the gun there is a flange or collar, *c'*, made around its rear end where it joins against the bottom of the cap and upon one side of flange opposite the arm of the plug, and against the bottom of the cap a cleat, *x*, is fitted, by which the plug is drawn back and securely held against the bottom of the cap. This cleat is to be snugly fitted upon the collar of the plug, so that the friction of the cleat upon the collar will arrest or break the fall of the plug into the recess of the cap. The cleat must, of course, be made and set upon a circle of which the diameter of the plug and the length of the arm is the radius, the cleat thus making, also, a guide and groove to govern and soften the fall of the plug. By these means the breech-plug can be removed from its seat, the gun loaded, and the breech-plug replaced without taking the breech-cap off the gun.

The object of the second of my said improvements is to give greater strength and durability to the supplemental-charge chambers and at the same time facilitate the construction of the gun. This object is accomplished by making the supplemental-charge chambers of separate pieces of metal of greater strength and hardness than the metal of the gun, and of then screwing them into sockets of corresponding shape made in the enlargement on the gun, as shown in the drawings by F. By making the supplemental-charge chambers of steel I obtain great strength and durability, and by making them of separate pieces of metal they are easily handled and bored; whereas, when these chambers are made in the metal of the gun, they rapidly deteriorate, and the boring and fitting of them is a work of great difficulty.

The object of my third improvement is to provide a better means of loading the supplemental-charge chambers. To accomplish this object I make the priming-hole as large as possible, having due regard to the strength of the gun, and fit it with a priming-plug of the construction substantially illustrated by Figs. 6 and 7 of the drawings. This priming-plug is made of bronze metal and consists, first, of a tubular screw-plug or bushing, G, that screws solid in sockets of corresponding shape cut in the top of the gun over each supplemental chamber. In this tubular screw-plug is fitted a tubular key, H. This key accurately fits the plug G, in which it is held by means of shoulders *a a*, made on opposite sides of it and arranged to lock under shoulders *b b*, of corresponding shape, made on the inside of the tubular plug or bushing G, as shown by Figs. 6 and 7. The shoulders of the key H enter the tubular plug G through grooves of corresponding shape, cut into its upper end, and then by turning the key its shoulders lock under the shoulders of the screw-plug, as above described, and the two shoulders, by being made slightly wedge-shape, draw the key down tight into its seat. In the tubular key H there is accurately fitted a solid plug, I, on the upper part of which a screw-thread is cut that matches a similar thread cut in the key. By this means the plug I can be screwed to and fro in the key. Now, the lower end of the plug I accurately fits the lower end of the priming-hole, and should be made smooth and protected from bruises when the plug is removed from the gun. It is for the purpose of protecting the nicely-fitted end of the central plug, I, that it is placed inside of the tubular key, of which it is really a part, back into which it can be screwed, and by which it is thus protected, as in a sheath, when removed from the gun. To charge the supplemental chambers, therefore, the plug I must be screwed back into its key, which must be unlocked and removed, the plug I coming out with the key, thus opening the priming-hole to the chamber. The top of the plug or bushing G is covered with a cap, *e e*, fitted closely around the top of the key, which must be made square, to receive a wrench by which it is to be locked and unlocked; and the same is true of the top of the central plug, I, which must also be fitted with a crank or wrench by which it is to be operated. The bearing of the

cap *e* on the upper end of plug G may be made in the form of an inclined plane and the cap fitted to it, so that upon turning the key the cap will have a tendency to start it from its seat. It will be observed that the key H locks into the screw-plug G, instead of being made to lock into a projection cast on the gun itself. In this there is great advantage, for in case the key be struck by a shot the disabled plug can be taken out and replaced by a new one.

The object of my fourth improvement is to facilitate the cleaning of the supplemental-charge chambers, and also to bore the steel bushing of the gun and mouth of the pocket. The first of these objects I accomplish by means of a plane pin, L, fitted into a smooth taper hole bored in the breech of the steel chamber, as shown by J, a projection, *f*, being made on the lower end of the chamber to receive a screw-cap, *e*, by which the pin is held in its seat, the top of the pin being screwed into the cap *e*, so that upon unscrewing the cap from the projection *f* the pin is drawn back with it. By these means a plain, smooth, tapering hole is opened in the breech of the chamber, the screw-thread by which the cap is held being outside of the projection *f*, so that no dirt can get into it in washing out the pocket, to interfere with the replacing of the pin, the end of which is, of course, provided with a suitable gas-check. The second of said objects is accomplished by means of a screw-bushing, K, Fig. 8, set in the bottom of the pocket, into which the pin L is fitted. The object of this bushing is to open a hole in the bottom of the pocket large enough to receive a boring-tool to bore the throat of the pocket through the steel lining of the gun—that is, in case the steel lining be put in after the steel pockets are fitted in their places; but in case the steel lining be first fitted in the gun and the pocket put in afterward, then the bushing K is not necessary; but in that case the neck of the steel pocket is divided at O, the end P being first fitted in its place against the steel lining of the gun, after which the main body of the pocket is screwed in its place, the main body of the pocket being screwed in after the hole is bored in the steel lining of the gun. Either style of these pins or plugs in the bottom of the supplemental chambers, with or without the bushing, may be used as a plug to the priming-holes of the supplemental-charge chambers, but the priming-plug above described as the third of my improvements is preferable.

The object of my fifth improvement is to obtain greater strength and durability of the gun as a whole. This object is accomplished by combining in the bore of the gun a bushing or lining of steel, Q, with steel supplemental-charge-chambers, or with supplemental-charge chambers R lined with steel, so as to form a continuous steel facing in both the gun and the pockets, substantially as shown by the drawings. The steel bushing in the gun gives it very much greater strength; but what is of much more importance in this gun is the superior hardness and toughness of steel over cast-iron, by which the bore of the gun is made to endure the destructive power of the gas issuing from the supplemental-charge chambers against its sides. The steel lining in this aspect of the gun becomes a matter of great importance, and the same is true of the throats of the supplemental-charge chambers, which would rapidly deteriorate if made of cast-iron or ordinary gun-metal.

The object of my sixth improvement is, first, to start the shot with a light and slower increasing initial pressure, to avoid undue strain upon the breech of the gun; second, to increase the pressure as rapidly as possible after the shot has passed the first pocket, to obtain the greatest possible velocity of the shot in the gun; third, to insure a complete consumption of all the powder placed in the pockets before the shot leaves the gun. The first of these objects I obtain by placing in the breech of the gun a small charge of slow-burning powder. The second and third I obtain by charging each pocket with a strong quick-burning powder. No slow-burning powder should be put in any of the pockets. To insure the last result all the supplemental charges must be of fine, strong, quick-burning powder, or the shot will not obtain its maximum momentum by a rapid accumulation of pressure from the first pocket, and will leave the gun before the powder is all burned. Putting slow powder in the first and second pockets as well as in the breech will not do. The pressure must accumulate as rapidly as possible and as soon as possible after the shot has got in motion and has passed the first pocket. The amount of powder for a ten-inch gun should be for the breech or initial charge about fifty pounds; for each of the supplemental-charge chambers, about one hundred and twenty-five pounds, the weight of the shot being seven hundred pounds.

Having thus described my several improvements, I claim and desire to secure by Letters Patent—

1. A screw breech-cap having a hole in its center and made to embrace the breech end of the gun, in combination with a breech-plug having a collar and swinging within the cap by an arm about a pivot, and held by a cleat bolted to the bottom of the cap upon the collar, substantially as shown and described, for the purpose specified.

2. In an accelerating-gun, the lateral supplemental-charge chambers, made wholly of separate pieces of steel or other suitable metal, the throats of the chambers to be contracted, and the steel or other metal of which they are composed to come flush with the bore of the gun or its lining.

3. In combination with the lateral supplemental-charge chambers of an accelerating-gun, a priming-plug arranged over each of said supplemental chambers, consisting of a tubu-

lar screw-bushing fitted with a tubular key containing and shielding or protecting a solid central screw-pin, substantially as described.

4. In an accelerating-gun having one or more lateral supplemental-charge chambers, the combination of a lining or bushing of steel in the bore of the gun, with a supplemental-charge chamber made wholly of steel or with an entire steel lining, the two being united to form a continuous facing of steel.

JAMES R. HASKELL.

Witnesses:

AMOS BROADNAX,

WM. H. BROADNAX.