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Discoveries & Improvements

IN

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AND

AGRICULTURE;

BEING A CONTINUATION, ON AN ENLARGED PLAN,

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Repertory of Arts & Manufactures.

A WORK ORIGINALLY UNDERTAKEN IN THE YEAR 1794, AND STILL CARRIED ON WITH A VIEW TO COLLECT, RECORD, AND BRING INTO PUBLIC NOTICE, THE USEFUL INVENTIONS OF ALL NATIONS.

NEW SERIES.—VOL. XII.

July—December, 1839.

LONDON:

PUBLISHED BY THE PROPRIETOR, J. S. HODSON,

112, FLEET STREET;

AND SOLD BY SIMPKIN, MARSHALL, AND CO., STATIONERS' HALL COURT; J. WEALE, HIGH HOLBORN; AND G. HERBERT, CHEAPSIDE.

Printed by J. S. Hodson, Cross Street, Hatton Garden, London.

which may be evolved into the furnace above the fire-bars. Atmospheric air is to be supplied by any suitable blowing apparatus, or a draft may be produced by the chimney, as is well understood, so as to supply the furnace with a constant flow of air above the fuel on the fire-bars, and the same will pass down through the fire, and between the fire-bars. The other parts of the drawing being clearly shewn, will readily be understood, and will require no further description.—In witness whereof, &c.

Enrolled February 28, 1838.

Specification of the Patent granted to JOHN DENNETT, *of New Village, in the Isle of Wight, in the County of Hants, Engineer and Surveyor, for Improvements in War Rockets, and in the Methods and Apparatus for applying the Powers of Rockets for the Purpose of obtaining Communication with Vessels which are stranded or in other Situations of Danger, also an Improved Instrument and Method for accurately Pointing Mortars for Throwing Shells, which may likewise be used for Firing Shot from Mortars, for the Purpose of obtaining Communication with Ships.*—Sealed August 2, 1838.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said John Dennett, do hereby declare the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

Rockets, as they are now manufactured, for military purposes, are generally constructed to burst their shells at

given distances, as nine hundred, one thousand two hundred, or one thousand five hundred yards, &c., according to the calibre, and they cannot be altered in the field to adapt them to any other ranges. Therefore, if a rocket constructed to explode at one thousand two hundred yards, be fired at a body of men, or other object, posted at one thousand four hundred yards distance, the shell will explode before it reaches them, and consequently render such fire useless, or if the object be at a less distance than one thousand two hundred yards, say one thousand yards, it is obvious that the rocket would pass beyond before the shell bursts, and the effect of the explosion be equally lost.

Description of the Drawing.

The object of my first improvement is to render rockets of any calibre more effective, by causing their united powers of penetration and explosion to be made available at all distances within their extreme range, by bursting their shells at the moment of impact on any object against which they may be fired. And this I accomplish by means of percussion fuzes of a peculiar construction, which are screwed into the fuze-holes tapped to receive them at the apex of the shells. These fuzes are made of copper, gun-metal or other fit material, and have a shoulder, on which is cut a male-screw to fit the fuze-holes, and a flange or run above it, on which it screws down firmly upon the shell. The body or shank is bored down to within about a quarter of an inch of the end, and this bottom or solid part is perforated with a smaller hole, into which is screwed a projecting piece or nipple, which receives a percussion-cap, nearly similar to those used for fowling-pieces. A plunger of iron, hard gun-metal, or other fit material, is accurately fitted into the bore, and of sufficient length to reach below the top of the cap; its upper end is made with a broad strong head, underneath this head is fitted a collar of cloth, felt, or other elastic substance of sufficient thickness to prevent the plunger from touching

the cap when it is put into the fuze, which should not be done till the rocket is prepared for firing. This collar is to prevent the plunger from being pushed with violence down upon the cap, and secures it against the danger of accidental explosion, but from the elastic nature of the materials, it will not prevent it from being driven down and exploding the cap when it strikes an object against which it is fired. The several parts may be understood by reference to the drawing No. 1.

I construct some rockets in a different manner. Instead of a nipple and cap; I make the bottom of the bore convex, and perforate it with one or more holes. In the bottom of the plunger is made a shallow cavity, which is primed with the detonating composition, which explodes on being driven down upon the convex bottom. In either case, a small flat must be made on one side of the plunger, to allow the air to escape when it is pushed into the fuze. As another variation, I construct some without a plunger. These are made with a strong neck or nipple, projecting above the flange on the outside of the shell, and on which a percussion-cap of larger dimensions is fixed. The parts below the cap are primed and perforated in the same manner as a priming tube for a piece of ordnance.

My next improvement is intended to increase the destructive effects of rockets, and to dispense with the pole or stick, which is at present always attached to them. Instead of the pole, I substitute a short iron-bar or rod, either solid or tubular, which screws into the centre of the rocket in the same manner as does the socket of the pole. To the other end of this bar or tube I attach a counterpoise of metal or other substance, of such form and weight as circumstances require. Some I make hollow of wrought or cast iron, of cylindrical or other forms, and these I charge with gun-powder, carcass-composition, case-shot, or combinations of them, or of other combustible or explosive materials, which powder or compositions are to be fired by fuzes, which ignite by the fire from the vent of

the rocket, and may be calculated to burn till after the rocket itself is expended. By such means, in addition to the ordinary powers of penetration, explosion, &c., which rockets possess, I obtain a subsequent power of explosion and conflagration.

To prevent the counterpoises from becoming heated by the fire from the rocket, and thereby endangering the ignition of the powder, &c. within them, I place a conical guard or shield of iron, a small distance above them, which prevents the fire of the rocket from infringing upon them. Through this guard or shield, the head of the fuze must project, which being primed and quickmatched in the usual manner, will insure its ignition when the rocket is fired. I sometimes also fix in the outside of the rocket case, certain ribs or projections of metal in a spiral direction, so as to cause it to rotate on its axis during the time of its flight, which tends in certain circumstances to preserve a greater accuracy in its direction. For case-shot counterpoises, the case may be cylindrical, of strong sheet-iron, with the lower end, or that farthest from the rocket, left open. In the upper end, or in a small chamber within it, I place a charge of powder, and over that a good strong wad of felt, leather, wood, or other fit substance, which must be closely fitted round the edge. On this I place in layers, as many musket or pistol balls, or buck-shot (according to the size of the rocket) as will nearly fill it, putting sawdust between the layers, so as to fill the interstices between them. I then close the cylinder with a good plug of wood driven down close upon the balls, or I place in the larger case several small cylinders, each loaded with powder, and one or more balls, the whole of which will be fired by a small portion of powder communicating with the fuze and their respective vents. It is obvious that such rockets fired amongst bodies of men or horses, must create great destruction and confusion, for after the rocket has produced its effect, and bursted the shell on its head, a volley of balls will be fired amongst

them from the other end in whatever direction it may point. These counterpoises screw on, so that either kind (ready charged) may be attached to the rocket during an action, to suit the circumstances of the required service.

The arrangement of the several parts may be understood by reference to the drawing, No. 2.

My next object relates to improvements for the extension of my system of applying the power of rockets for saving lives from shipwreck, by enabling the crew of a vessel at sea to take out the crew of another which is waterlogged, or otherwise in danger of foundering, in which state they are so frequently fallen in with, and from the great difficulty, and some times impossibility of relieving them by the means at present resorted to, they are too often necessarily abandoned to their fate, and the people left to perish after the most dreadful and protracted sufferings. The object of rescuing my fellow-creatures from this most horrible of all descriptions of wreck, to which the seaman in his innumerable dangers is exposed (though its appalling circumstances, which often place him beyond the reach of human aid, are not witnessed by the eye of benevolence on shore, and consequently are not so generally understood and provided against as those which happen upon our coast), I endeavour to accomplish as follows: The vessel intending to render the assistance having taken the most eligible position to leeward of the wreck, and obtained a communication by means of a rocket and apparatus which I have previously invented, and which are well known, for the use of ships; she then by means of the rocket line, sends on board self-inflating life-slings, which I have invented for the purpose, to which is previously bent a rope, running through a tail-block, lashed to the yard-arm and through a leading-block near the deck. A guy is also bent to the one of the thimbles at the lower part, and when hauled on board the wreck, another guy is bent to it, instead of the rocket-line. It is then ready to be alternately hauled from one vessel to the other. Into these slings, a

man places himself, sitting astride the seat which crosses them, and then on giving a signal with his hand, comes overboard, when he will be immediately hoisted on board the other vessel by the whip-fall at the yard-arm. When in the slings he is perfectly secure, for he can neither sink nor be washed out of them, and is quite protected from injury should he chance to swing against the side or rigging whilst being hoisted in. These self-inflating life-slings are constructed in the following manner. I take three strong hoops, like mast-hoops, large enough for a stout man to pass easily through them; across one of these I fix a narrow board, which forms a seat, the upper side of which I pad with cork shavings and canvass, I then connect them firmly together with white rope, the ends of which are spliced together to form double-slings, which cross underneath the seat, and to the four parts of the rope; the hoops are then securely seized at the necessary distance apart. In the two bights of the rope above the hoops is seized a large brass-thimble, to which the whip-fall bends for hoisting. Two other thimbles are also fixed by straps on the opposite sides of the lower hoop, to which the guys are to be bent when in use. On the outside of the frame of hoops is securely fixed an air-vessel, composed of canvass or other material, rendered perfectly air and water tight, by a solution of caoutchouc or other fit waterproof composition. It may be made of various forms, but perhaps the most eligible is that of a short cylinder, terminating at bottom by a truncated cone; two or three narrow hoops are securely fixed inside of the outer coat of the cylindrical part, to keep its circumference extended. In the upper end of this cylinder is fixed a short stop-cock of largish bore, the plug of which may screw in, or turn, in the ordinary manner. It is evident that when not in use, the machine may be compressed, so as to bring the hoops close together, and it will then be nearly flat, and will occupy but very little room. Now, supposing it to be in this condition, with the stop-cock

open, if we gradually extend it to its full dimensions by pulling at the opposite ends, the pressure of the atmosphere will cause the air to rush in through the opening of the cock, until it completely fills the space within, the stop-cock being then turned will securely retain it. By this simple operation it becomes self-inflated, and capable of floating a very considerable weight. But, in case it be desirable to obtain a higher degree of inflation, I attach a small force-pump, or injector, which is a small cylinder, formed of the same material as the air-vessel itself; the circumference of this cylinder or pump, is kept extended by a spiral-wire, or series of small hoops, whilst it is capable of being compressed and extended in the direction of its length. The top and bottom of this cylinder are formed of wood or other fit material, in each of which is an air-tight valve, opening inwards, and closed by a slight spring, and across the top is attached a handle. By briskly working this cylinder, or in other words extending and contracting it in the direction of its length, more air may be forced in.

These self-inflating life-slings may also be used with great advantage for conveying the people to the shore from a stranded ship, when suspended to a block, traversing on an hawser, for which purpose they will be infinitely more safe and convenient than a cot, or other apparatus at present in use.

They may also be used with equal advantage in rescuing the people from a vessel wrecked at the foot of a perpendicular cliff, as Portland, Freshwater, &c., when attached to a cliff-gin which I have contrived for that purpose. This is represented in the drawing, No. 3.

My next improvement is to enable persons in either of the cases above mentioned, to use a combination of rocket power, by which means the line may be carried out to a much greater distance than usual, or a much larger line be conveyed if circumstance require it, and this without making any change or alterations in the apparatus pre-

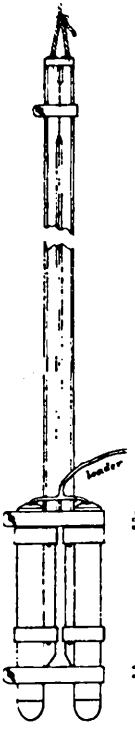
viously supplied, which I consider an object of great importance, as ships and stations already equipped, can immediately avail themselves of the advantages which it offers at a very trivial expense. This I accomplish by connecting the rockets together, by means of shackles, or clamps of iron, which go on over the rockets and secure with screws. One of these fixes round the rockets at the lower ends, close to the vents, and another immediately above the upper ends of the poles. In the upper one is fixed a wood-chock or saddle, with semi-circular ends, which form a seat for that part of the rockets, and supports them firmly at the distance required, by the intervention of the poles. This chock is fixed to the iron clamp only at one side, which leaves the clamp at liberty to spring open when the screw is slackened, which renders it easily to be slipped on or off over the ends of the rockets. One or more clamps of a smaller size are slipped on over the poles, and screwed fast to keep them together in a proper position. In order that the two rockets may ignite at the same instant by the priming of the lock of the rocket-frame, I connect their vents by a leader composed of several strands of cotton or worsted quick-match, which leader is covered with a tube of cloth rendered waterproof by a solution of caoutchouc or other composition. Each end of this leader is fixed to a cross of copper or brass, two arms of which are bent at right angles, so as to enter the vent of the rocket into which they are pushed, and by their elasticity they expand and retain the leader in its position. The other two arms reach across the vent and form stops, to prevent it being pushed into the rocket too far. The ends of the leader go through the centres of these spring-crosses, and project about an inch into the vents of the rockets. To the centre of this leader is attached another limb of the same description, long enough to reach into the pan of the lock; this end being well primed, will ignite by the sparks and convey the fire simultaneously to both rockets. These arrangements are explained in drawing, No. 4.

My next is an invention of an instrument for accurately pointing mortars, by a line correctly coincident with the axis of the bore, instead of lines temporarily chalked upon the outside of the mortar, as is now practised, by which the errors arising from any difference in the thickness of metal, or in other words, want of concentricity between the axes of the interior and exterior surfaces of the metal, will be obviated. This instrument may be made of brass or other metal, or partly of wood and metal. It consists of a stem or main-piece, which must be two or three feet longer than the mortar, and worked perfectly true, with its sides parallel to each other, and of equal thickness, which must be sufficient to prevent any tendency to bend by its own weight. On the upper surface of this piece a middle line is correctly marked through its whole length. An opening is cut through this piece from the upper end, about two thirds its length, and in this opening is strained a silk cord or fine wire, correctly coinciding with the middle line above mentioned. Across the upper surface of this piece are fitted two other pieces, correctly at right angles with it, and their centres exactly coinciding with the middle line, their length being about one eighth of an inch less than the diameter of the bore of the mortar with which it is to be used. These pieces slide up and down on the stem, to adjust the distance between them to the length of the bore, and they screw fast by the milled heads on the under side. To the upper one is attached a spirit-level, by which it may be placed level. On the lower one, or on the end of the stem, is fixed a weight, sufficient to prevent the other end from preponderating when it is placed in the mortar. If the instrument be placed in the bore of the mortar, with its upper surface level across, or in the direction of the trunions of the mortar, the cross pieces resting on the surface of the bore, and the long arm with the opening in it projecting beyond the face of the piece, the wire or cord in it will accurately correspond with the axis of the bore and form a prolon-

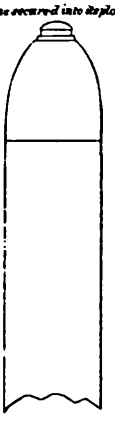
gation of it in that direction, whatever be the form or imperfections of the outside. Things being thus arranged if two pickets be driven into the ground in the direction of the object to be fired at, and a fine line strained between them, passing over the mortar (in the manner practised in the French service), and the mortar traversed till the wire in the instrument coincides with this line, the bore of the mortar will be correctly pointed for the object. On the underside of the outer end of the long arm or stem, is fixed a small quadrant or semi-circle, accurately graduated with a small spirit-level, turning on its centre, and carrying an arm or index, by which the elevation of the bore is determined. Instead of a spirit-level, a silk cord may be suspended from the centre, with a plummet at the lower end; the silk will then cut the angle of elevation. The plummet and part of the cord should be immersed in a vessel of water or other fluid, to prevent its vibrating by the action of the wind. When the plummet is used, if the mortar is traversed till the wire in the stem, the pendulum and the object be seen in the same plane, the pointing is correct. In this case the line and pickets will not be necessary, but may all be used together if preferred. This is explained by the drawing, No. 5.

Having thus described the nature of my invention, I would remark that I lay no claim to any of the parts which may have been before known and in use, and variations may be made in some of the parts so long as the principles of my invention be retained, and which I have fully explained in this my specification.—In witness whereof, &c.

Enrolled February 2, 1839.



Base secured into its place. Section of Fuze



Plunger

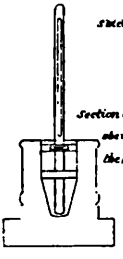
elastic collar

Upper side of the Flange

Shield

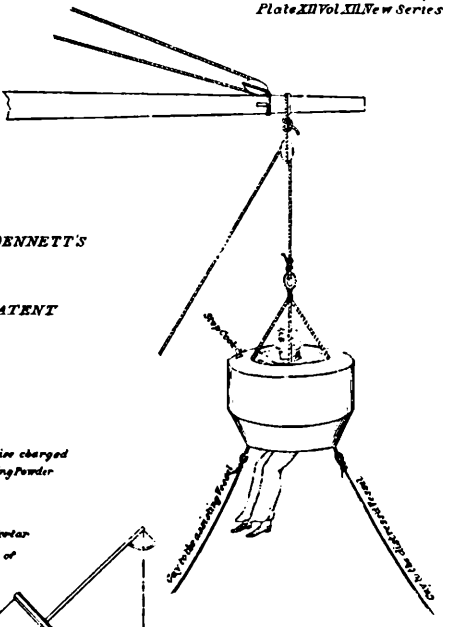
Fuze

Counterpoise charged with bursting Powder



Section of an 8 in. Corner Mortar shewing the application of the Instrument.

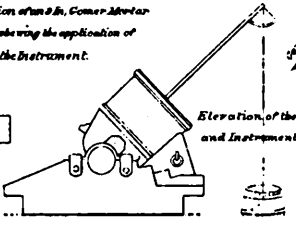
DENNETT'S PATENT



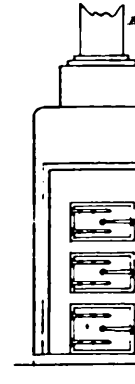
Stretcher

Cord to the bursting Powder

Cord to the detaching Hook



Elevation of the Mortar and Instrument.



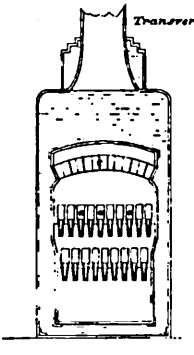
Loader

lower Clamp

upper Clamp

Wood Chock

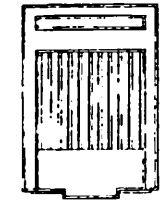
Elevation



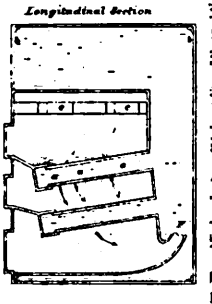
Transverse Section

Section of Fire Bar

NEVILLE'S PATENT



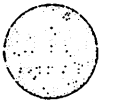
Plan

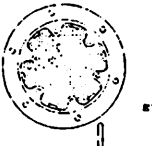


Longitudinal Section

The Flue at F when broken off to be continued through the Boiler in any shape or direction.

PRICE'S PATENT





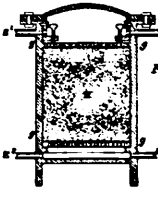
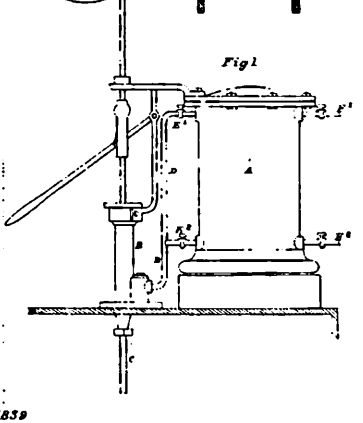


Fig 2

Fig 1



LONDON Hodson 118 Fleet Street October 1 1839