

Improvements in ambulance apparatus / [John Denis MacDonald].

Contributors

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PROVISIONAL SPECIFICATION.

Improvements in Ambulance Apparatus.

I JOHN DENIS MACDONALD, M.D., F.R.S., Inspector General R.N. of 11 St. James's Road, Surbiton, Surrey, do hereby declare the nature of this invention to be as follows:—

- It consists in A New Stretcher Fittings, and B New Combination Stretcher
- 5 Slings.
- A. The new Stretcher Fittings include
1. Poles of a new and improved pattern.
 2. New Self adjusting hinged Cross Pieces, and
 3. New automatic Feet. (Sheet A).
- 10 1. The Poles may be composed of sheet iron, wood or bamboo. They are distinguished from those hitherto in use by being provided with handles longer in the fore part of the Stretcher than those at the back in the proportion of 11 to 5 or thereabout. They are also provided with Ring Straps to which the Slings may be readily attached for lifting, and from which they may be as readily released.
- 15 2. The Cross Pieces consist of two arms severally hinge-bolted to the Poles of the Stretcher, or to an intervening pair of wood Blocks furnished with a connecting plate, and forming a moveable Trestle (Fig. 3). The opposite ends of these arms are curved off into two discs. The innermost of these respectively meeting its fellow, they are bolted together to form a hinge, upon which the arms close up as the
- 20 poles of the Stretcher come together, or otherwise open out as the poles of the Stretcher are separated (Fig. 8). When the poles of the Stretcher are separated to their limits the outer discs also come together, and are automatically locked by a spring pin-catch. The arms are then practically a rigid extended bar (See Figs. 2 (a) 6 & 7).
- 25 The advantages secured by this arrangement are that while the Old or Regulation cross pieces are complex, difficult to manage, and require to be fixed by special arrangement, the new cross pieces are simple, and, being automatic, easy to manage.

[Price 11d.]

A

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3. The new Feet consist of two curved metal plates bolted together transversely, and so balanced as to carry the axle bolt of the Roller at the lower end across the perpendicular from the axle bolt of the upper end. Thus the Foot is made to fall naturally into the right position. Lateral movement is impossible. And while a stop bolt checks the upward movement of the Foot from its place in one direction reversal is prevented by the superincumbent weight (See Figs. 1 & 10). 5

The advantages secured by this construction are that while the Feet hitherto in use are fixed by special arrangement and liable to dislocation the new Feet are automatic and are not liable to dislocation. Moreover while the Feet hitherto in use raise the Stretcher only six inches from the ground rendering the lifting difficult to the bearers, the new Feet raise the Stretcher nine inches or more. A further relief of four or five inches to the bearers in stooping to lift is secured by the arrangement of the Ring Straps upon the Poles. The feet can also be folded up under the Stretcher when it has to be rolled into an ambulance wagon (See Figs. 2 & 3). 10

The improved Trestle and Fittings may be screwed or strapped on to the Poles of existing Stretchers: or the Fittings without the Trestles may be so attached (See Figs. 4 & 5). 15

The new Stretcher Fittings may moreover be adapted to domestic or camping use as a portable impromptu bedstead. Adjusted to Poles of suitable length and construction they would furnish a comfortable shake down bedstead, which could be immediately extemporised, and stowed away, when done with, with equal expedition. 20

B. The new Combination Stretcher Slings consist of 1 A Waist Belt. 2 Two Shoulder Straps, and 3 Two Frog Hooks (Sheet B).

1. The Waist Belt may consist of a single Strap made to buckle in front. But it is better composed of two straps made to buckle behind and in front. In the latter case the Slings can be readily adjusted to the differing proportions of the various Bearers (See Fig. b). 25

2. The two Shoulder Straps are made to slide upon the Waist Belt behind to secure a nice adjustment to the body of the Bearer (Fig. 1 (b)). 30

In the Old or Regulation Slings, which consist of one leather band looped at the ends to receive the handles of the Stretcher, the pressure comes more upon the back of the neck than upon the Shoulders and the necks of the Bearers are galled when they have to carry a patient to any considerable distance. The new Combination Sling removes this inconvenience, taking the pressure off the neck and distributing it equally between the Shoulders loins and hips. 35

3. The Frog-Hooks, which are two in number to each bearer, are made to slide upon the Belt and to hold the Ring Straps, which are permanently attached to the handles of the Stretcher. They consist of a broad loop or ring of metal with a flange or upward extension, a neck or downward extension ending in a hook, and a Shackle attached to the neck. The flange or upward extension of the loop or ring is intended to give stability to the tackling and to prevent reversal in the attempt to disengage the Hook from the Ring Strap. The Hook is of a new pattern. It is provided with a hinge or moveable joint, which enables it to fall back upon the neck, in which position it is locked upon the Ring Strap by the Shackle falling over it (See Figs. 1. 2 & 3). 45

Another great advantage secured by the New Ambulance Apparatus is that it frees the hands of the Bearer, while carrying, to minister to the patient.

The new Combination Stretcher Slings, together with their Complementary Ring Straps, may be adapted to existing Stretchers. 50

EXPLANATION OF THE DRAWINGS.

A. NEW STRETCHER FITTINGS.

Fig. 1 (Scale 1 inch to the foot). Side elevation of New Stretcher with Ring-straps *in situ*. The handles in front are longer than those behind in the proportion

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of 9 to 6, or better still of 11 to 5, and the points of suspension are carried as far forward as practicable. The whole of the space intervening may be occupied by canvas; but in the Figure the length of the canvas is shewn at 6 feet 3 inches. This gives the bearers more room. The feet, notwithstanding their curvature, raise the poles of the Stretcher about 9 inches from the ground.

Fig. 2 (Scale as Fig. 1). Hinder portion of Stretcher seen in face from below, shewing new cross-piece (a), connecting plate (b), Bolt plate (c) of the Foot (d), which is connected with the Stretcher pole by the wood block (e).

Fig. 3 (Scale as Fig. 1). Lateral elevation of the same, the Foot folded up to be rolled into an Ambulance Wagon. References as in Fig. 2.

Fig. 4 (Scale as Fig. 1). Transverse section to shew the formation of the Trestle for supporting the poles. References as in Fig. 2.

Fig. 5 (Scale slightly larger). Trestle folded up as when Stretcher is packed for storage or transit. References as Fig. 2.

Fig. 6. Cross-piece seen from above shewing (a) the hinge, (b) the supplementary hinge-piece, (c) the catch-pin hole, and (d) the end bolt hole.

Fig. 7. Cross-piece seen from below shewing the Spring Catch-pin or pin-catch closed. References as Fig. 6.

Fig. 8. Cross-piece with hinge flexed and Spring pin-catch open. References as Fig. 6.

Fig. 9. Connecting and Supporting plates. A The principal plate shewing position of screws by which it is fastened to the Wood Block (See Fig. 10 e). The larger and more central screw-bolt is designed to hold the Cross piece which is figured in dotted lines. The three open Screw holes near the longitudinal slit and the slit itself are for securing the Trestle either by Screws or by Strap and buckle. B The supplementary angular plate consists of two parts, the one (a) passing transversely beneath A just behind the transverse piece, to which, when extended, it serves as a stop; while the second portion (b) is vertical and internal and designed to give support and fixity to the Stretcher pole.

Fig. 10, shews construction of undershot Foot, its connection with the Wood Block and the attachment of the latter through the connecting plate by Strap and buckle to the poles. (a) Bamboo handle. (b) Canvas. (c. c.) Straps and buckles for securing the Trestle to the Stretcher. (e) Wood Block to which the Foot is attached by a grooved bolt plate (f), confining the axle bolt. (g) External curved plate of the Foot. (g¹) Internal curved plate of the Foot. (h) Axle bolt of the Foot. (i) Axle bolt of the Roller (k). (l) Upper stop bolt to fix the Foot when resting on the ground. (m) Lower stop bolt to support the Stretcher when it is rolled into an Ambulance Wagon.

Fig. 11. Bolt plate. (See Fig. 10 f.) A lateral view. B seen in face from below.

B. NEW COMBINATION SLINGS.

Fig. 1 (Scale $\frac{3}{16}$ of an inch to the inch). Slings with Shoulder Straps, Waist belt, and Frog Hook *in situ*, and, on left side, Stretcher Ring Strap attached. (a) Waist belt. (b. b.) Shoulder Straps. (c. c.) Frog Hooks. (d) Stretcher Ring Strap *in situ*, with corresponding Frog Hook.

Fig. 2. (Scale $\frac{1}{4}$ of an inch to the inch). Frog Hook seen in face and on Waist Belt *in situ*. The point (a) which is movable at the joint (b) is pressed backwards, while the Shackle (c) movable at the joint (d) is made to fall over it and lock it upon the ring of the Stretcher Ring Strap, from which locking it cannot be released without lifting the Shackle and straightening the Hook.

Fig. 3 (Scale as Fig. 2). Lateral view of Frog Hook to shew the construction of the Strap and the arrangement of its loops. Tracing the Strap from the buckle downwards in front of the Waist Belt, it passes first through the sliding loop (a), next through the ring of the Hook and again back through the sliding loop. It then ascends behind the Waist Belt, passes through the standing loop (b), then through

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the binding loop (*c*), and over the base of the buckle, pierced by its tongue, and terminates below the standing loop (*e*), which is made large enough to include also the end of the Shoulder Strap after the latter has passed through the buckle which surmounts the Frog Hook (See Fig. 1).

Fig. 4. Stretcher Ring Strap as affixed to the hinder handle of the pole, and there 5
secured by means of a staple.

Fig. 5. Lateral view of the same to shew the construction, which is similar to that of the Frog Hook Strap, only that the buckle holds a more central position. The Strap passes round the Stretcher handle. The sliding loop (*a*) gives fixity to the ring. 10

Fig. 6. Ring noose made of small rope which may be used as a substitute for the leather Strap and buckle.

Signed this 2nd day of February 1888.

JOHN DENIS MACDONALD, M.D.

COMPLETE SPECIFICATION.

Improvements in Ambulance Apparatus.

I JOHN DENIS MACDONALD M.D. I.H. R.N. F.R.S. late of 11 St. James' Road, Surbiton, and now residing at La Maissonnette Claremont Road, Surbiton, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

5 My improvements consist in A. New Stretcher Fittings, and B New Combination Stretcher Slings.

A. The new Stretcher Fittings include

1. Poles of a new and improved pattern.

2. New self-adjusting Traverses or Cross pieces. (See Sheet A Figs. 1—11)

10 Furnished with the Provisional Specification.

3. New Automatic Feet, and

4. New arrangement of the canvas.

1. The poles may be composed of sheet-iron wood or bamboo. They are distinguished from those hitherto in use by being provided with handles longer in the fore part of the Stretcher than at the back, in the proportion of 12 to 6 or there about. The advantage of this difference, is that the handles extend forwards on either side of the foremost bearer, thus giving him a more convenient hold of the Stretchers. The poles are also provided with 'Ring Straps' as a permanent fitting, consisting each of a stout strap and buckle including the pole handle at one end and carrying an iron ring at the other, or the free extremity. The Ring Straps afford a good hold for lifting and sustaining the weight while the ring is being connected with the Frog hooks of the Slings.

The poles are moreover provided with a series of perforations about 6 or 8 inches apart, to carry lashings or stops for the canvas as hereinafter described.

25 2. The Traverses or Cross pieces consist each of two parts with a hinge joint and a pin catch in the middle, so as to admit of the poles being held apart or brought together when not in use. The outer extremity of each arm is hinge bolted, either directly to the corresponding pole of the Stretcher or to a separate wood block with a connecting plate above, thus, forming with the feet attached, a movable Trestle to be screwed to the poles or otherwise secured by Strap and buckle (Figs. 1—5).

Where the two arms meet in the middle of the Traverse, each presents two flat diverging flanges a corresponding pair of which are bolted together to form a hinge, while the two others, with a central perforation are held together by a spring pin-catch. Thus, though the hinge and the pin catch are in the same horizontal plane, they are on opposite sides of the neutral axis of the traverse; the hinge being on the inner side, when folded up, and the button of the pin catch is drawn downwards to release it. Again, when the poles of the Stretcher are separated and the arms of the Traverse are brought into line the latter are automatically locked by the spring pin catch.

40 catch.

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The Traverses act then, practically as a rigid bar. The Traverses hitherto in use are difficult to manage, while those here described are simple, automatic and easily managed (Figs. 6, 7 & 8).

3. The new Feet consist of two curved metal plates bolted together transversely and so balanced as to carry the axle bolt of the roller at the lower end across the perpendicular from the axle bolt at the upper end. Thus the foot is made to fall automatically into the right position determined by a stop-bolt; and while lateral displacement is impossible reversal is prevented by a slide bolt under voluntary control and by the weight superimposed. The upper axle bolt of the foot is confined by a screw plate to the under part of the wood block with which the arm of the corresponding Traverse is connected above by a screw-bolt passing through a metal plate, which, while it is fixed to the upper face of the block is intended also to be fixed in its place beneath the poles either by screws or otherwise by strap and buckle. This has accordingly been named the connecting plate. The advantages secured by the new feet are, that, while the feet, hitherto in use if movable at all, are fixed by a special arrangement, and liable to dislocation, the new feet are automatic and not subject to casual displacement. Moreover, that while the feet in ordinary use raise the Stretcher only about 6 inches from the ground, the new feet elevate the Stretcher 9 inches or more. A further relief to the bearers in stooping to lift is gained by the length of the Ring straps attached to the poles. And finally the feet can be folded up under the Stretcher when it is to be rolled into an ambulance wagon, or put away (Figs. 1—5, 10 & 11).

4. The fitting of the canvas to the poles in the new Stretcher is by a series of lashings or stops instead of nails. The length of the canvas six feet two inches and the first and last lashing are within one inch of the free border before and behind; so that, if the intermediate stops be six inches apart, the number on each side will be thirteen. Each cord is about ten inches long, whipped at the ends, proportionately narrow, but well made and strong. The bight or middle part is fixed below to a staple, which crosses the lower aperture of the vertical perforations in the middle plane of the poles. The ends of the cord are passed up through the opening and carried inwards and downwards to be fixed to the canvas in the following manner. On the under surface of the latter, and about nineteen inches apart are two longitudinal folds of the material, large enough to carry a stout piece of ratan cane six feet two inches long with eyelet-holes of the required number above it.

The ends of the lashings are passed up through these, then round the cane and on either side of the standing part, and tied in a sailor's knot below.

Outside the fold carrying the cane and eyelet holes the lapel of the canvas may either hang over the poles or be folded over the patient.

This arrangement permits of the removal of the canvas for washing and of its being used with bamboo or simple rounded poles if preferred.

The cane not only helps to equalise the tension, but removes all strain from the Eyelet-holes, which under ordinary circumstances are so readily torn through.

B. The new Combination Stretcher Slings, consist of 1. A Waist belt. 2 Two Shoulder straps 3. Two Frog-hooks & 4. the two Ring Straps already noticed as being permanently attached to the Stretcher Handles (See Sheet B. Figs. 1—6). Furnished with the Provisional Specification.

1. The Waist belt may consist of a single band made to buckle in front, or of two straps made to buckle both in front and behind. In the latter case, the slings can be more conveniently adjusted to the different proportions of the bearers and when done with, the two halves of the waist belt can be conveniently utilised for holding the parts of the stretcher together (Fig. 1 a).

2. The two Shoulder Straps are made to slide upon the waist belt behind, to secure a nice adjustment to the body of the bearer. In the old regulation Slings, which consist of one long leather band looped at the ends to receive the handles of the Stretcher, the pressure comes rather upon the back of the neck than upon the Shoulders. The words of an official statement are "They are intended to be passed round the neck of the bearers to act as braces and assist in keeping up the weight of

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the Stretcher when in use" (see Moffit's Manual of Instructions &c. p. 66). From this it will be easily understood how the necks of the bearers are galled when they have to carry a patient to any considerable distance. But the new combination Slings obviate this inconvenience, taking the pressure off the neck and distributing it between the shoulders loins and hips (Fig. 1. *b*).

3. The Frog hooks are made to slide upon the Waist belt, and hold the ring straps below, while they are connected with the shoulder straps by buckle alone. The hook is of a new pattern, having a broad loop for the leather strap, with a narrow upward extension or flange intended to prevent reversal. The neck of the hook is furnished with a shackle, and the terminal part forms a movable joint with a hinge which enables it to be pressed backwards upon the neck, and the shackle falling over it locks the hook. Thus, it will be seen, that, when the ring of the ring strap is included, it can only be released by lifting the shackle and removing the hook by drawing out the terminal joint (Figs. 1—3).

4. The Ring Straps though permanently attached to the Stretcher represent the loops of the regulation Slings, and they may be described as a strap and buckle with the addition of an iron ring, so arranged as to form a loop for the Stretcher handle below, and carry the ring at the upper end, to be connected with the Frog hook. In one useful form a small piece of rope is used instead of the leather strap, and the iron ring or eye is passed through a split thimble, with a loop spliced round it at the upper end, while a simple noose is formed below. This latter is fixed in its proper place on the Stretcher by a staple (Figs. 4, 5, & 6).

As in our Army and Navy and in the Constabulary a waist belt is always in the regular equipment, and the ring straps being attached to the Stretcher, the shoulder straps and Frog-hooks only are required to convert a man into a bearer. Indeed when the shoulder straps are present for the valise, the Frog hooks alone would be required. Moreover, as the present regulation Slings are worn over the Service equipment, the benefit of the new slings would far outweigh the objection of adding so little more to the existing arrangement.

A very decided advantage in the Combination Slings is that in using them the hands of the bearer are free to minister to the patient; and moreover, the weight is so evenly distributed as to permit of the easy expansion of the chest in breathing, and obviate that sense of oppression which is ever present under hitherto existing conditions; especially where the distance to which the patient has to be carried is considerable.

Finally, it may be stated that the new Stretcher arrangement would be suitable for use as a camp-bedstead or with trifling modification, very useful in private life; and the principle of the Combination Slings would be applicable for lifting and carrying weights under other as well as ambulance requirements.

Explanation of the Drawings which accompanied the Provisional Specification and to which reference has been made in the text.

SHEET A. THE STRETCHER.

Fig. 1. side elevation of the new Stretcher with ring straps *in situ*. The handles in front are longer than those behind in the proportion of 12 inches to 6, and the point of suspension in both cases, is carried as far forwards as possible. The length of the poles being 7 feet 8 inches and that of the canvas 6 feet 2 inches, affording sufficient room for the bearers, and notwithstanding the curvature of the feet the plane of the stretcher is raised upwards of nine inches from the ground.

Fig. 2. the after half of such a Stretcher seen in face from below, showing the new cross-piece (*a*), the connecting plate (*b*), the bolt plate (*c*), of the foot (*d*), which is connected with the stretcher pole by the intervening wood block (*e*).

Fig. 3. lateral elevation of the same, with the foot folded up as when required to be rolled into an ambulance wagon.

Fig. 4. end elevation or transverse section showing the formation of a trestle to support the poles.

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Fig. 5. shews the trestle, on a little larger scale folded up as it would be either attached to the poles when not in use, or for storage or transit. References as in Fig. 2.

Fig. 6. the cross piece seen from above shewing (a), the hinge (b) the supplementary hinge piece (c), the catch-pin hole and (d), the end bolt-hole. 5

Fig. 7. ditto seen from below, showing the spring-pin catch closed. References as in Fig. 6.

Fig. 8. ditto with hinge flexed and spring catch open. References as in Fig. 6.

Fig. 9. connecting and supporting plates. A The principal plate showing the position of the several screws by which it is connected with the wood block 10 (e Fig. 10). The larger and more central screw bolt is for the end of the cross piece seen in outline. The three open screw holes at each end and the longitudinal slit between them are for securing the trestle by screws or by Strap and buckle. B The supplementary angular plate consists of two portions, the one (a), passing transversely beneath A, just behind the transverse piece, to which, when extended it forms a useful 15 stop; while the second portion (b), is vertical and internal designed to give additional support and fixity to the Stretcher pole.

Though lightness is effected by the above arrangement, with stouter material both plates (A & B) might be forged in one piece.

Fig. 10. shows the construction of the under-short foot, its connection with the 20 wood block and the attachment of the latter through the connecting plate by Strap and buckle to bamboo or simply rounded wooden poles.—(a) Bamboo handle (b.) canvas, (c. c.) Straps and buckles for securing the trestle to the stretcher, (e) the wood block to which the foot is attached by a grooved bolt plate (f) confining the axle-bolt. (g) External curved plate of the foot (g¹) internal plate of the same. 25 (h) Axle bolt of the foot. (i) Axle bolt of the roller (k). (l.) Upper stop bolt to fix the foot when resting on the ground, but a small slide bolt passing beneath this as described in the text gives further security preventing reversal.

Fig. 11. the bolt plate (f Fig. 10). A. lateral view. B. seen in face from 30 below.

SHEET B. COMBINATION SLINGS.

Fig. 1. the new Combination Slings, with the shoulder straps and Frog hooks 35 *in situ* with the waist belt and on the left side the stretcher ring-strap attached (a) Waist-belt (b b) shoulder straps. (c c) Frog hooks (d) Stretcher ring-strap *in situ* with corresponding frog hook.

Fig. 2. frog hook seen in face and *in situ* on the waist belt. The point (a) which 40 is movable at the joint (b) is pressed backwards, while the shackle (c.) movable at the joint (d) is made to fall over it and lock it upon the ring of the stretcher ring strap from which it cannot be released without lifting the shackle and then straightening the hook.

Fig. 3. lateral view of the Frog hook to show the construction of the strap and 45 arrangement of the loops. Tracing the strap from the buckle downwards in front of the waist belt, it passes first through the sliding loop (a), next through the ring of the hook and again back through the sliding loop. It then ascends behind the waist belt, passes through the standing loop (b), then through the binding loop (c), and 50 over the base of the buckle, pierced by its it terminates a little below the standing loop (e), which is made large enough to include also the end of the shoulder strap after the latter has passed through the buckle which surmounts the Frog hook (see Fig. 1).

Fig. 4. the Stretcher Ring Strap represented as affixed to the after handle of a 55 Stretcher pole secured by a staple.

Fig. 5. lateral view of the same to show its construction which is similar to that of the Frog hook strap, only that the buckle holds a more central position; the strap passes round the Stretcher handle below, and the sliding loop (a) is above for the 55 fixity of the ring.

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Fig. 6. a Stretcher ring noose made of small rope as a substitute for the leather strap and buckle.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what
5 I claim is :—

1. Poles for stretcher provided with handles conveniently longer in front of canvas than in the rear ; furnished with special perforations having a staple at one end, for attachment and transmission of separate lashings or stops, to secure the canvas ; and provided moreover, with permanently fitted Ring Straps for convenient attachment to
10 slings.
2. Trestles with wood blocks surmounted by connecting plates, which may be conveniently screwed to poles specially made, or attached by strap and buckle to any ordinary poles.
3. Traverses provided with diverging flanges one pair of which serves for a hinge,
15 while the other carries a pin catch, and being so arranged that both sets of flanges are on opposite sides of a neutral axis.
4. Feet each composed of two curved plates connected by transverse bolts, constructed to drop automatically into position, and retained in position by means of a slide bolt.
- 20 5. Canvas provided with eyelet holes protected by cane included in a lateral fold of the material to be secured to the poles by special lashings passing through the eyelet holes as above described.
6. Slings specially contrived so as to distribute the burden between the muscles of the shoulders, loins and hips of the carriers, and consisting of a waist belt carrying
25 Shoulder Straps, and furnished in front with two Frogs carrying special hooks, with which the Ring Straps of the Stretcher are connected.

Dated this Twenty third day of November 1888.

JOHN DENIS MACDONALD.

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1889.



State of New York, County of Albany

In SENATE, January 12, 1886.

REPORT OF THE COMMISSIONERS OF THE LAND OFFICE, IN ANSWER TO A RESOLUTION OF THE SENATE, PASSED MAY 1, 1885.

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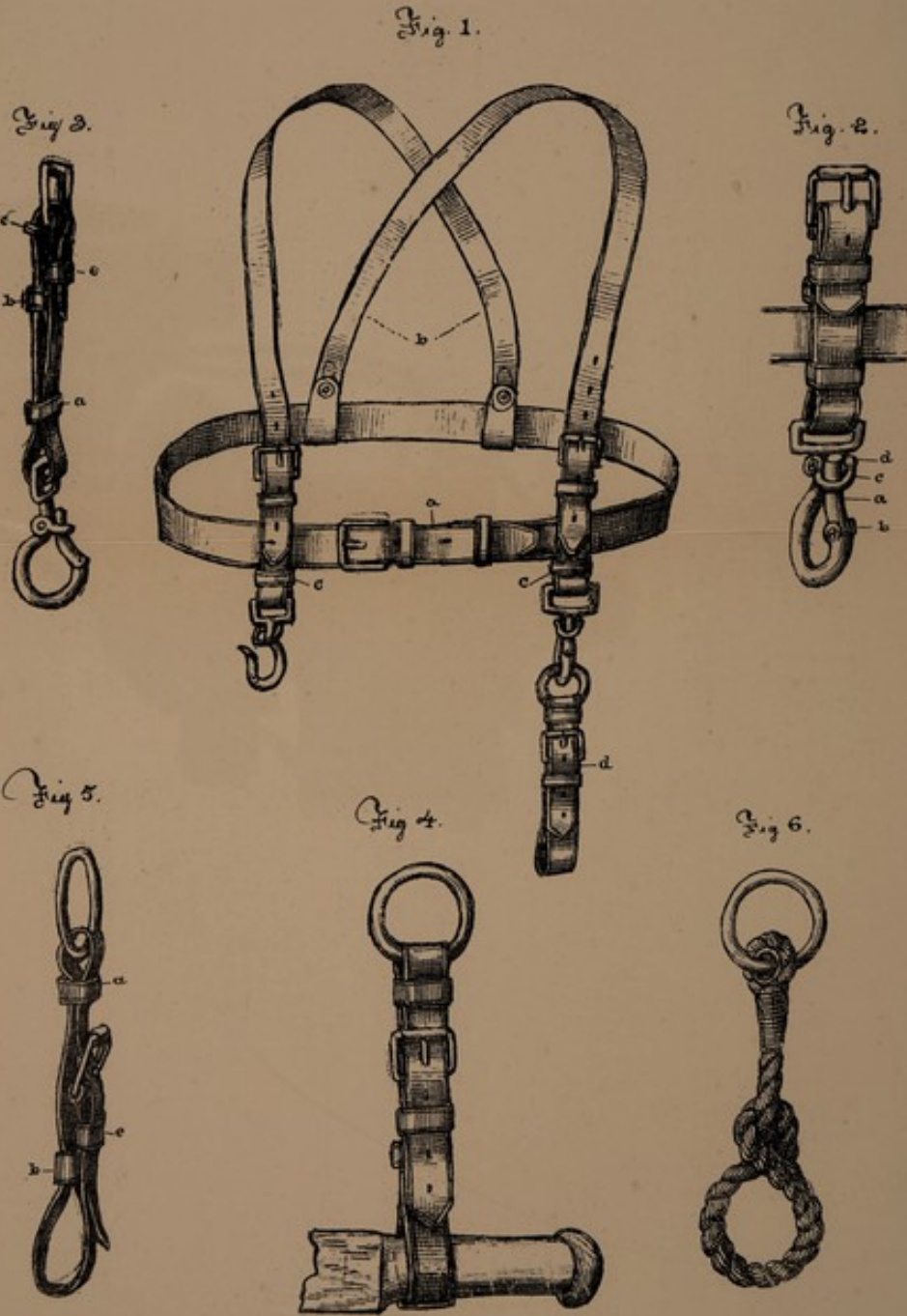
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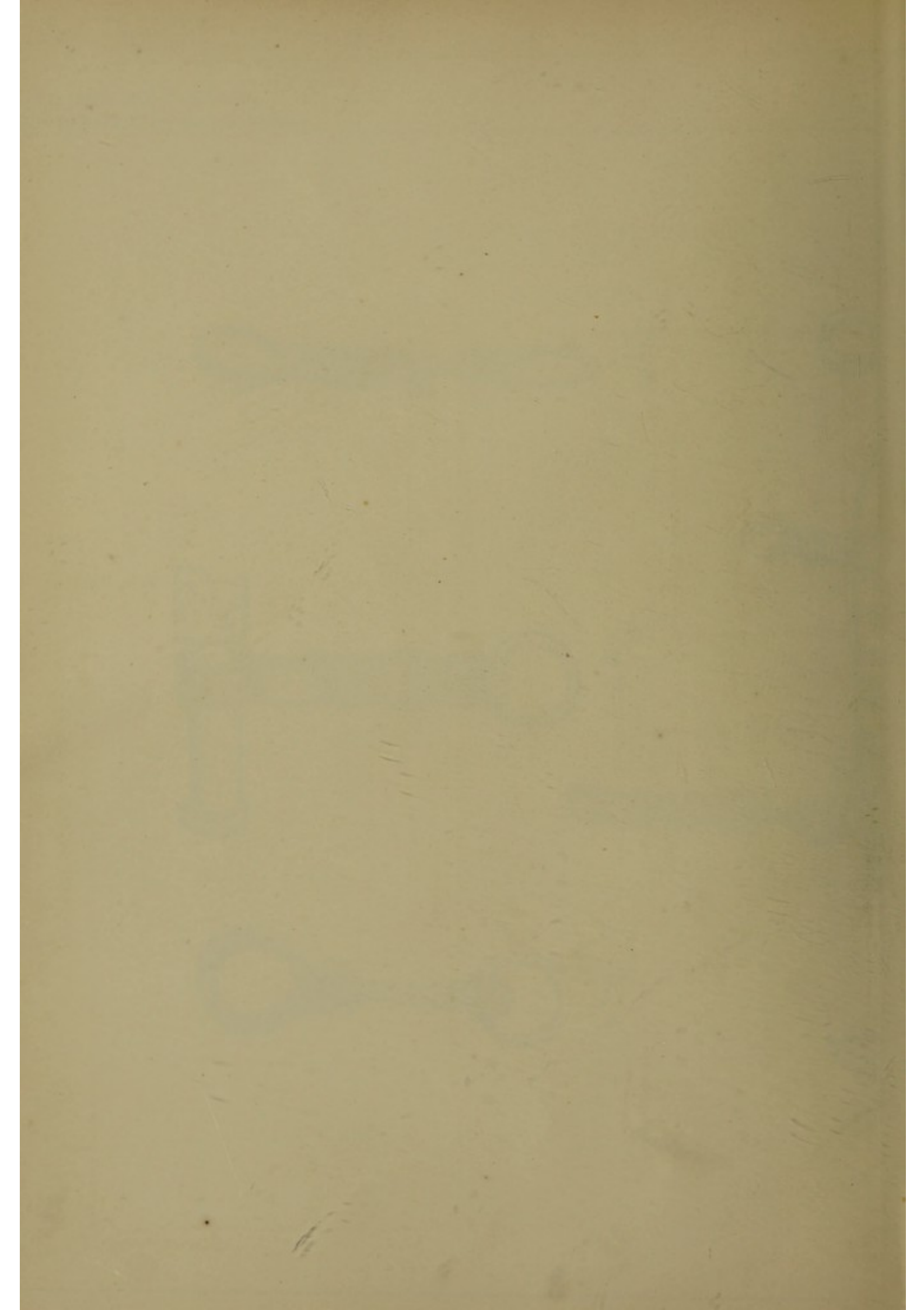


Fig. 1.



Fig. 2.

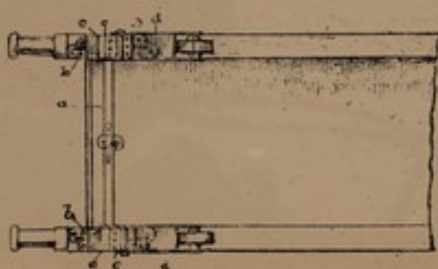


Fig. 3.



Fig. 4.

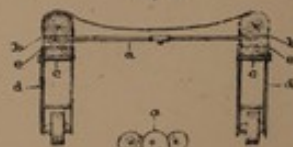


Fig. 5.

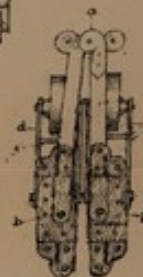


Fig. 6.

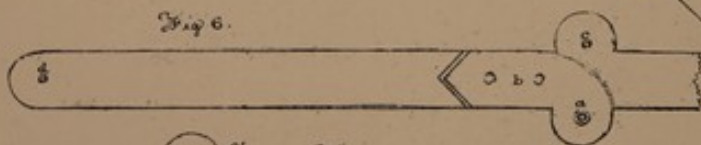


Fig. 7.

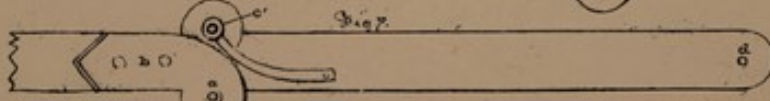


Fig. 9.

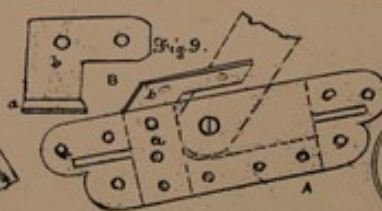


Fig. 8.



Fig. 10.

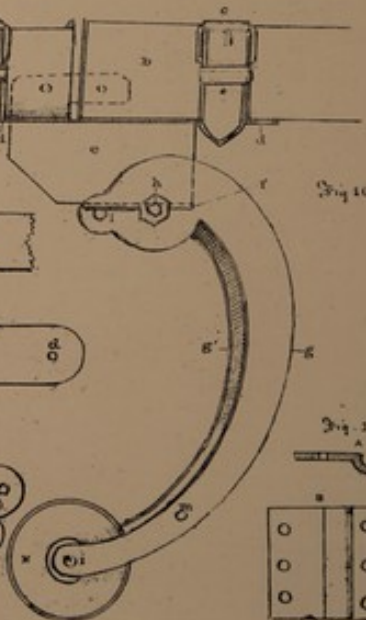


Fig. 11.

