2 Sheets—Sheet 1.

G. L. ANDERS.

Printing Telegraph.

No. 210,895. Patented Dec. 17, 1878.

Fig. 1.

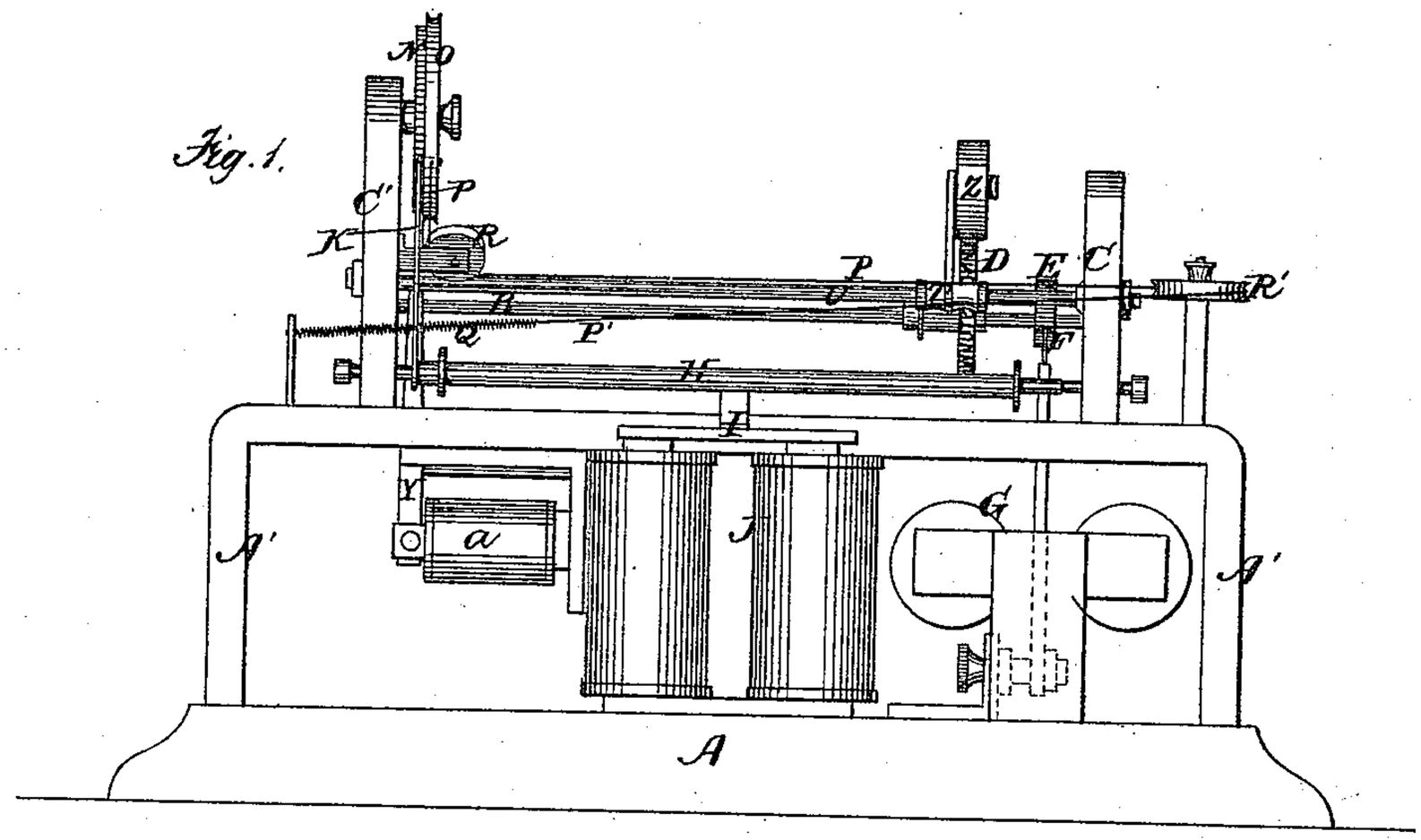


Fig. 2.

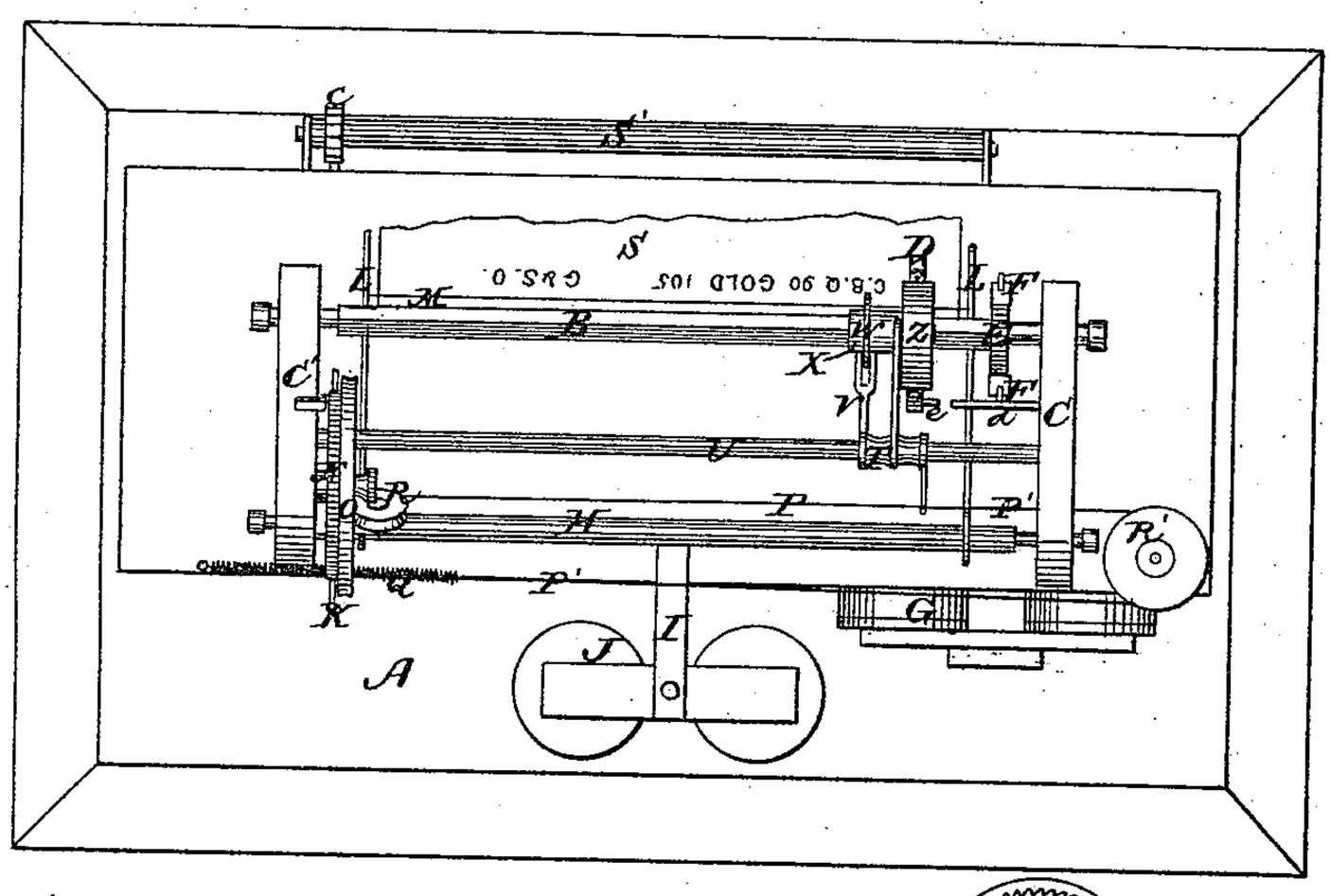
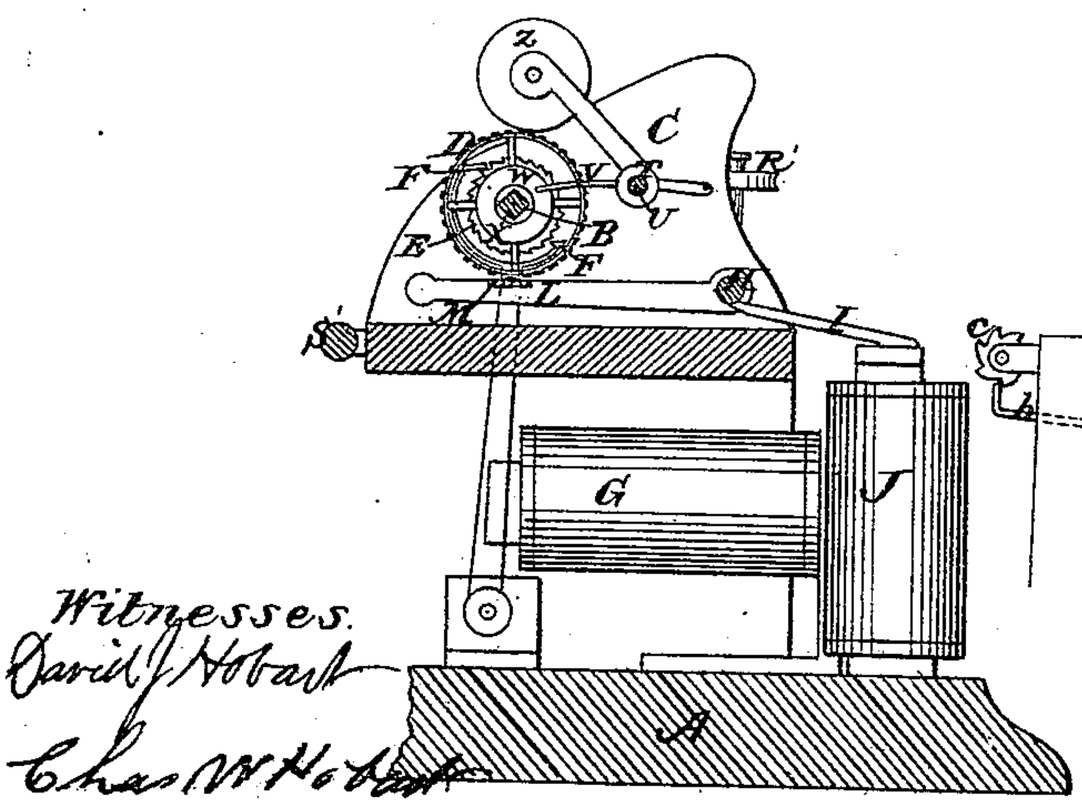
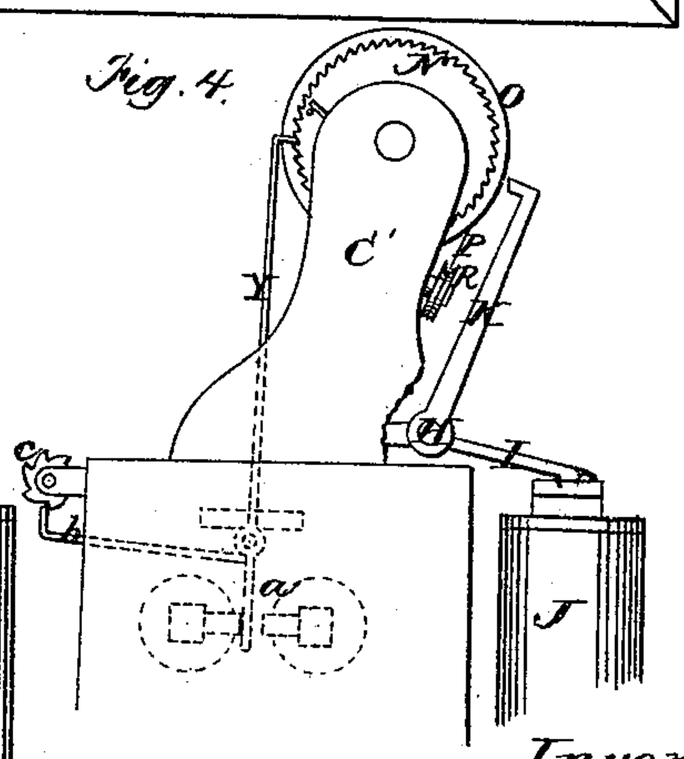


Fig. 3.



Witnesses.
David J. Hobart
Chas. W. Hobart

Fig. 4.



Inventor
George Lee Anders
by his attorney
Alfy L. Hayes

UNITED STATES PATENT OFFICE.

EDWARD W. SERRELL, OF CASTLETON, NEW YORK.

IMPROVEMENT IN ARMORS FOR VESSELS.

Specification forming part of Letters Patent No. **210,811**, dated December 10, 1878; application filed October 7, 1878.

To all whom it may concern:

Be it known that I, EDWARD W. SERRELL, of Castleton, in the county of Richmond and State of New York, have invented an Improvement in Armors for Vessels of War, Fortifications, &c., of which the following is a specification:

The object of this invention is to obtain great strength to resist the impact of projectiles without the great weight heretofore inseparable from such armor. It is a recognized fact that the armor now employed for vessels of war is too heavy to admit of safety in sea-going vessels, and it is too light in proportion to the blows that have to be resisted.

Efforts have been made to employ both water and air in connection with the armor-plates upon vessels; but such fluids have not been within the armor-plates themselves, but only as an intervening medium between the armor and the vessel.

My invention consists in a cellular armor in which the metal (preferably steel) is so disposed as to resist the impact of the projectile, and the cells are filled with water, or other non-elastic fluid, and closed, and of such a shape that the blow from the projectile will not permanently alter the shape of the cell, and the force will be dispersed in all directions by the liquid filling the cells, thus rendering harmless the blow from the projectile.

The cells are provided with supply and discharge pipes in such a manner that all air will be permitted to pass away, and the cells can be emptied when the vessel is not in action, and the cells dried by the admission of heated air. Furthermore, the inner surfaces of the cells can be rendered water-proof by oil or varnish, introduced when dry.

In the drawing, Figure 1 is a section of the armor vertically; and Fig. 2 is an elevation of the face, partially in section.

The cellular armor has a metal face, *a*, which is flat or curved, according to the position where the same is to be used; as my invention is available as armor-plating for turrets, or for the sides of vessels, and the armor is of a total thickness adapted to the ultimate strain to which it may be exposed.

The armor is cellular and provided with one, two, or more ranges of cells. I have shown two such ranges of cells, the range *b* having cells that are nearly hemispherical, and the range *d* having cells that are nearly spherical. The metal partitions between these cells are to be proportioned in thickness to the strain to which they are exposed, and the weight of metal is lessened by arranging the cells in the positions shown in Fig. 2, so that the sides of the cells shall be hexagonal and the divisions flat, or nearly so.

It will be evident that when each cell is filled with confined water, or other non-compressible liquid, any blow upon the surface cannot penetrate the metal without displacing the water, and that the concussion upon the face of one cell is distributed upon the entire interior surface of such cell. Therefore, if that cell cannot change its shape permanently, the blow of the projectile will be resisted; hence the metal only requires to be of sufficient thickness to resist the punching action of the shot when thus backed up. And it will also be apparent that the compressing action upon the water in one cell tends to expand that cell, and the pressure is taken upon the walls thereof and transferred to the adjacent cells; and in this manner one cell supports another, and the elasticity of the metal allows the concussion to be thus distributed and rendered harmless, so long as the concussion and pressure of the water do not exceed the ultimate tensile strength of the metal employed.

It will be evident that the armor-plates may be made in sections of greater or less size, and that each section will be preferably cast in one piece. However, the parts may be of wrought metal, properly riveted or welded together, or the surface may be of steel and the cells of gun-metal, cast upon the steel while in a sufficiently-heated condition.

The water or other liquid is supplied by suitable pipes to the cells, so as to insure the entire filling of each cell and the separation of one from the other.

I have shown in Fig. 3 the tubes as introduced at the center of the cells, and provided with pipes *d'* and *i*, that are turned up and down within the cells; and the central pipe, *e*, is made with two water-ways, communicating with the respective pipes *d'* and *i*; or the water-ways may be in the cast metal, as shown at *k*,

UNITED STATES PATENT OFFICE.

GEORGE L. ANDERS, OF BOSTON, ASSIGNOR TO E. BAKER WELCH, OF CAMBRIDGE, MASSACHUSETTS.

IMPROVEMENT IN PRINTING-TELEGRAPHS.

Specification forming part of Letters Patent No. **210,895**, dated December 17, 1878; application filed August 14, 1877.

To all whom it may concern:

Be it known that I, GEORGE LEE ANDERS, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Printing-Telegraphs, of which the following is a full, clear, and exact description, reference being had to the drawings accompanying and forming part of this specification.

The object of this invention is to obtain a telegraph for printing stock and market quotations, and for other purposes, which will print on sheets of paper in lines arranged as in ordinary printing, and thereby avoid the inconveniences attendant upon the use of a continuous fillet of paper, and enable the matter printed to be easily and conveniently referred to; and to this end the invention consists in a printing-telegraph having, in combination with the impression device, mechanism, constructed and operated as described hereinafter, to impart a lateral or transverse movement to the type-wheel after each impression, and having mechanism operating to return the type-wheel or the sheet of paper to its starting-point and feed the paper longitudinally.

In the accompanying drawings, Figure 1 is a front elevation of the instrument. Fig. 2 is a plan view of the same. Fig. 3 is an end view, partly in section. Fig. 4 is another end view, showing the feeding and releasing devices. Fig. 5 is a diagram, showing the arrangement of magnets and circuits; and Fig. 6 is another diagram, showing another arrangement of magnets and circuits which may be used.

In these several figures the same letters refer to the same parts.

Referring to the drawings, A A′ is the frame-work supporting the magnets and the working parts of the instrument. B is a square shaft, having its bearings in suitable standards C C′, attached to the frame A′; and D is a type-wheel, of the usual form, which is rigidly attached to a sleeve, X, which slides upon the shaft B, but, owing to the form of the said shaft, turns with it. Instead of being square, this shaft may be provided with a groove, or otherwise constructed, so as to produce the same result.

The shaft and type-wheel are shown as rotated step by step, in the usual manner, E being the ratchet-wheel, F the propelling-pawl, and G the electro-magnet effecting this result; but the improvement is applicable to printing-telegraphs in which the type-wheel is rotated continuously, the manner of moving the type-wheel forming no part of the invention.

Behind the shaft B, and also supported in the standards C C′, is a rock-shaft, H, which has attached to it the armature I of an electro-magnet, J, and also a frame, L, supporting the impression-pad M. This impression-pad lies under the type-wheel shaft B, and is equal, or nearly equal, in length to the width of the sheet S, upon which the printing is effected, which sheet is fed between the impression-pad and the type-wheel shaft from a roller, S′.

N is a ratchet-wheel, supported by and rotating upon a suitable bearing attached to the standard C′; and upon the same shaft as this ratchet-wheel and rotating with it is a grooved wheel, O, to which is fastened one end of a cord, P, which passes over a pulley, R, and is attached to a sleeve, T, sliding upon the rod U, supported between the standards C C′, parallel to the shafts B and H, and, passing over the pulley R, is attached to the spiral spring Q. This spring acts to return the sleeve to its starting-point. This sleeve T supports the inking-pad, and also has attached to it the forked arm V, the fork of which embraces the flange W upon the sleeve X, so that when the sleeve T moves upon the rod U it will carry the type-wheel with it.

When the printing-pad is moved by the action of the printing-magnet J to effect an impression the rock-shaft H will oscillate, and a pawl, K, attached to this rock-shaft will engage with the ratchet-wheel N and rotate it the distance of one tooth. The cord attached to the grooved wheel O will be wound upon the same, and consequently the sleeve T and type-wheel connected therewith will be drawn laterally or transversely to the paper sheet the distance of one letter. The spring Q is stretched by the movement of the sleeve T, and consequently tends to draw back the sleeve and type-wheel, and causes the ratchet-wheel N to have a tendency to rotate in a direction reverse to that in which it is moved by the pawl K; but this reverse rotation and the return of the type-wheel are prevented by means of the holding-pawl T, which engages with the teeth of the ratchet-wheel. When, however, the end of the line of printing is reached, or sooner, if