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A.D. 1807 . . . . . N° 3078.

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## Flat Belt or Band for Coal Mines, &c.

### W. & E. W. CHAPMAN'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, WILLIAM CHAPMAN, of the Town and County of the Town of Newcastle-upon-Tyne, Civil Engineer, and EDWARD WALTON CHAPMAN, of the same place, Rope Maker, send greeting.

- 5 **WHEREAS** His present Majesty King George the Third, by His most gracious Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Thirtieth day of October, in the forty-eighth year of His reign, did give and grant unto us, the said William Chapman and Edward Walton Chapman, His especial licence that we, the said William
- 10 Chapman and Edward Walton Chapman, our executors, administrators, and assigns, or such others as we, the said William Chapman and Edward Walton Chapman, our executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make,
- 15 use, exercise, and vend, within England, Wales, and the Town of Berwick-upon-Tweed, our Invention of "A METHOD OR METHODS OF MAKING A BELT OR FLAT BAND FOR THE PURPOSE OF DRAWING COALS, OR OTHER MINERALS, UP THE PITS OR SHAFTS OF MINES, AND FOR RAISING OF HEAVY ARTICLES IN ANY SITUATION WHATEVER;" in which said Letters Patent there is contained a proviso obliging
- 20 us, the said William Chapman and Edward Walton Chapman, by an instrument in writing under our hands and seals, or under the hand and seal of one of us, particularly to describe and ascertain the nature of our said Invention,

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and in what manner the same is to be performed, and to cause the same to be inrolled in His said Majesty's High Court of Chancery within one calendar month next and immediately after the date of the said recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear. 5

**NOW KNOW YE**, that in compliance with the said proviso, we, the said William Chapman and Edward Walton Chapman, do hereby describe and ascertain the nature of our said Invention to be as follows, namely:—

First, in the combination of two or any greater number of strands of shroud-laid rope, laid side by side, so as to form any determinate breadth of belt or 10 flat band; and,

Secondly, in the peculiar machinery for facilitating its formation.

A strand of a shroud-laid rope is the first combination of the yarns, which are twisted together round one common axis, so as to form a compact cylindric mass; and the common shroud-laid rope is formed of three of these strands 15 twisted together the contrary way to the twist of the strand, which for common purposes is necessary, although the loss of strength is so considerable that, exclusive of the reduction of length from being made into a rope, the strength of two strands made in such a way as to make all the yarns bear an equal tension, or nearly so, will, when laid side by side, be nearly equal to that of 20 three such strands combined in a rope; from which circumstance the chief advantage arises in forming the strands into belts, instead of making them into ropes.

Having explained the advantage the public may derive from the use of these belts, we now proceed to shew what appears to be the best method of 25 putting them together, and then to describe the machinery we have invented for that purpose. The belts will be best composed of an equal number of strands, each alternate one twisted the contrary way to the other, so as to counteract the tendency they would otherwise have to twist round one another. It is also eligible that the yarns for the differently twisted strands 30 should be twisted contrary ways. Four, six, or eight strands will form the most convenient belt, but each extreme verges towards its respective disadvantage, (videlicet) if liable to be chafed the broad belt will be soonest injured; but, on the other hand, the narrow belts, from the necessarily increased thickness of the strands, will sooner destroy themselves by bending over the pulleys. In 35 forming the flat belts, attention should be paid to the strands being all brought to an equal tension before they are combined together, which combination may be done in any manner at the pleasure of the manufacturer. They may be rivetted together, at proper intervals, with strong iron wires, or laced or

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stitched together. The easiest way of stitching them is whilst they are laid at length in the rope ground to attach each strand to a rope, on which, by means of leading pulleys, equal loads or weights may be suspended, which will stretch each strand equally. If these weights descend to the ground, they  
5 may be raised by heaving at the opposite end of the proposed belt. Means, of course, must be taken to prevent the strands untwisting, which may easily be done by fastening a sufficient weight below each where they are attached to the stretching ropes, so as to prevent their turning round. The degree of tension upon each strand should be proportionate to what the whole belt has  
10 to bear. The remaining process is to combine the strands side by side, which, as before observed, may be done in any manner at the pleasure of the operator. We shall, however, describe a method of doing it, (*videlicet*) by having a sledge or four-wheel truck resting under the strands, with a frame at or a little above their level. On each side of which is affixed a screw *a, a*, Fig. III. in  
15 the annexed Plan; hollow within, so as to receive the shank of a large needle, with an eye near the point, as in some needles used for packing bales. Each of these screws may point rather obliquely across the strands which are to compose the belt; and be kept in its due direction by two standards or bars *c, c*, Fig. III., with cylindric holes, through which the screw passes, leaving a  
20 space between the bars to receive a nut or concave screw *m*, Fig. III., with arms, through which the screw will likewise pass. In the screw there must be a groove parallel to its axis, to receive a feather or thin piece of steel, fixed in a longitudinal groove in one or both of the cylindric holes *c, c*, through which the screw passes, so that on turning the nut *m*, it shall push forward or  
25 draw back the needle. Fig. III. shews the truck, with its screws and needles. The size of the latter may be enlarged or reduced at pleasure, to suit belts of any size; but the screws and truck will be common to all, by means of what we shall call a belt board; see *n, n*, Fig. I., II., & III. The belt board is formed of elm, or any suitable wood or other substance; in the middle of it  
30 there must be a groove of suitable width, to admit the designed number of strands or lines to lie side by side, and of any suitable depth, to retain them in their places; also the thickness of the bottom of each belt board may be such as to raise the centre of the strands to a level with the needle; or, to save the necessity of numerous belt boards, one side may be made to approach to or  
35 recede from the other by means of screws; and when placed upon the truck, the use of any belt, this board must be adjusted by wedges or screws to for such level as that the centre of the strands or lines shall lie fair to the directions of the needles; also the bottom of the belt board, opposite the side opening, should be hollowed sufficiently to admit the swelling of the strands on

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the passing through of the needle. It is obvious that the strands or lines should be kept firm down in their places, which in general will be sufficiently done by the level of the belt board being rather higher than the direction they are stretched in, as shewn in Fig. II.; but should this not be deemed sufficient, they may be pressed down in the groove, by weights fitting it, 5 or by rollers at each end. The strands or lines being stretched, as described, one or any suitable number of these trucks, with their apparatus, may be placed under them so as to expedite their being stitched together, the process of which is as follows, (videlicet) a suitable thong, thread, or line, of length sufficient to make any convenient number of stitches, has a not or 10 other fastening at one end, and the other is put through the eye of one of the needles, which is then by turning the nut pushed through all the strands or lines. It will be eligible to have the end tapered which goes through the needle. On drawing the end from the eye of the needle, the latter is drawn out of the belt by turning the nut the contrary way, and then the thread or 15 line is drawn tight, and the truck is brought forward, so as to bring the point of the other needle to the proper position for making the next perforation, which, after inserting the end of the thread, is done as the preceding; and in this manner the operation goes forward until the thread be exhausted. The end is then either fastened to the next thread, or secured in any convenient 20 way, and the operation is continued to the completion of the belt. Or the stitching may be performed by first pushing the needle through the strands or lines, and then putting the thread through the eye, and hauling it through on the withdrawing of the needle, in which case direction of the needles must be towards the tail or receiving end of the truck. The connecting of strands side 25 by side, by interlacing, is so obvious as to need no description. If the rivetting of them by strong wires or rivet pins be deemed eligible, the pins may be forced through by having two side screws, similar to those described, placed upon the truck directly opposite to each other, and pointing in the same line. One of these screws may have a cylindric piece of steel, with a sharp point, by 30 which a hole may be made through the belt; and the end of the other should have a socket, into which the head of the rivet pin may be inserted. The pin may be about the eighth of an inch in diameter; and on entering the point in the hole made by the instrument from the other side, the rivet pin may be pushed through, and the truck brought forward to the proper position for the 35 next, which may be at a space equal to the width of the belt; after which, and putting on the rivet or burr, the pin may be rivetted over it. To prevent the head and rivet of the pin from injuring the strands or lines they attach together, little pieces of leather, with holes through them, may be used; one

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piece slipped over before the pin is put through, and the other put on before the rivet. The screws on each side of the sledge need not be made, as already described, as they will be better for revolving round their axis, therefore in place of passing through cylindric holes or guides, they must go through cor-  
 5 respondent hollow screws, and have handles or fliers at their outer ends, by turning of which they will be drawn backwards or forwards as wanted. Also the screw, before described, for pushing through the needle need not indispensably be prevented from turning round by means of a longitudinal groove and feather, as the same end may be answered by making an extension to one  
 10 end of the screw, of any form which will not turn round, but let it slide backwards and forwards through a suitable groove. Likewise in place of needles, piercers may be used, and the tapered ends of the stitching lines be put through. In the use of the belts for raising weights of any kind, it will be most adviseable for the belt to be confined to roll upon itself as a spiral; but in  
 15 some cases this may be dispensed with; the hauling forward of the truck any determinate space between each stitch may be done by means of a winding barrel on the sledge, and a chain or rope leading from it to any fixed object, and in a variety of ways so obvious as to require no description, although the progressive transition of the machine from place to place is one of its most  
 20 essential constituent parts, because without this moveability it could not be applied to the stitching of any belt where its parts to be thus connected are lying stretched at length side by side. But if the operator prefer drawing forwards the belt or flat band as it is stretched, then the truck or frame may be stationary, and without wheels.

25 All that this Invention consists of, is the use of strands laid side by side, so as to acquire a strength which ropes used in this manner would not have; and also the Invention of the truck or frame, with its apparatus for combining speedily and correctly together any requisite number of strands, or other flexible substances, laid side by side.

30 In witness whereof, we, the said William Chapman and Edward Walton Chapman, have hereunto set our hands and seals, the Twentieth day of November, in the year of our Lord One thousand eight hundred and seven.

WILL<sup>M</sup> (L.S.) CHAPMAN.

35 EDW<sup>D</sup> W. (L.S.) CHAPMAN.

Signed, sealed, and delivered (being first  
 duly stamped) in the presence of

W. H. SMOULT.

GEO. AYRE.

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In Chancery.

George Ayre, of the Town and County of Newcastle-upon-Tyne, Gentleman, maketh oath and saith, that William Chapman, of Newcastle-upon-Tyne aforesaid, Civil Engineer, and Edward Walter Chapman, of the same place, Rope Maker, did duly sign, seal, and as their respective act and deed deliver, 5 the Deed Poll hereto annexed, in the presence of this deponent and William Hunter Smoult, of the same place, Gentleman, and saith, that the names or characters "Will<sup>m</sup> Chapman" and "Edw<sup>d</sup> W. Chapman," thereto set or subscribed as the parties executing the same, are of the respective proper handwriting of the said William Chapman and Edward Walton Chapman, and 10 that the names or characters "W. H. Smoult" and "Geo. Ayre," thereupon indorsed as the witnesses attesting the execution thereof, are of the respective proper handwriting of the said William Hunter Smoult and him this deponent.

GEO. AYRE. 15.

Sworn at Newcastle-upon-Tyne aforesaid,  
the Twentieth day of November, 1807,  
before me,

ROB<sup>t</sup>. WALTERS,

A Master Extry. in Chancery.

20.

Inrolled the Twenty-fourth day of November, in the year above written.

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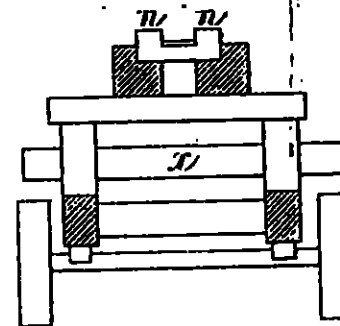
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Printers to the Queen's most Excellent Majesty. 1856.

A.D. 1807. OCT. 30. N<sup>o</sup> 3078.  
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*Cross Section of Truck & Belt Board.*

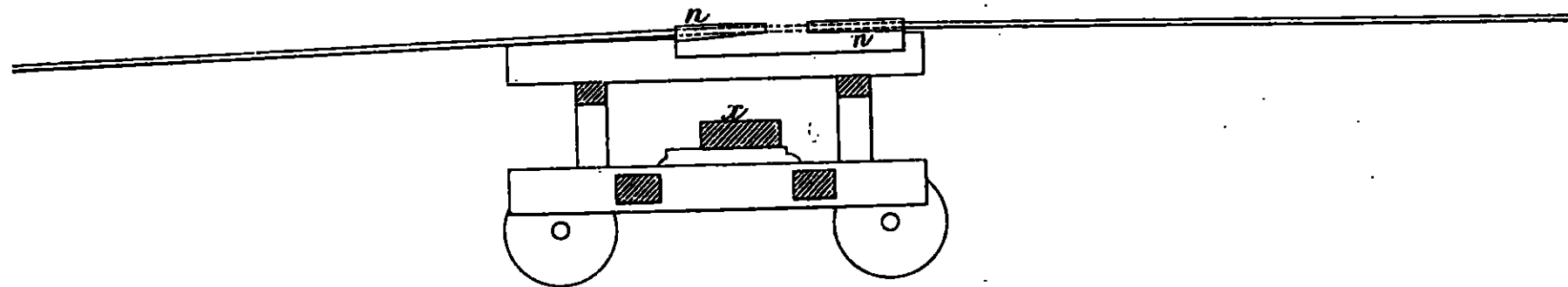
FIG. I.



*Gross piece to bear the Standards of the Screws*

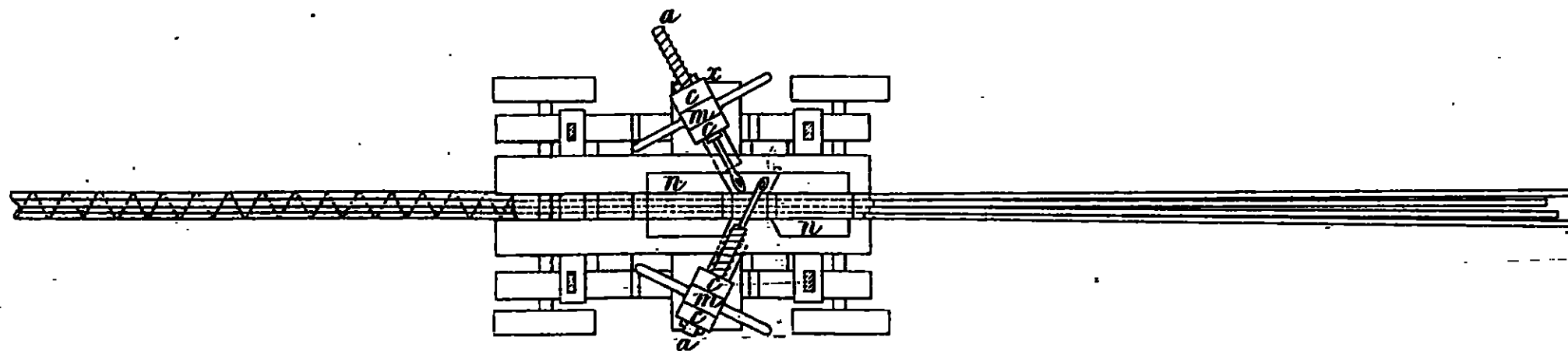
*Longitudinal Section of Truck & Belt Board.*

FIG. II.



*Plan of Truck & Belt Board.*

FIG. III.



*The enrolled drawing is colored.*

*Drawn on Stone by Malby & Sons.*