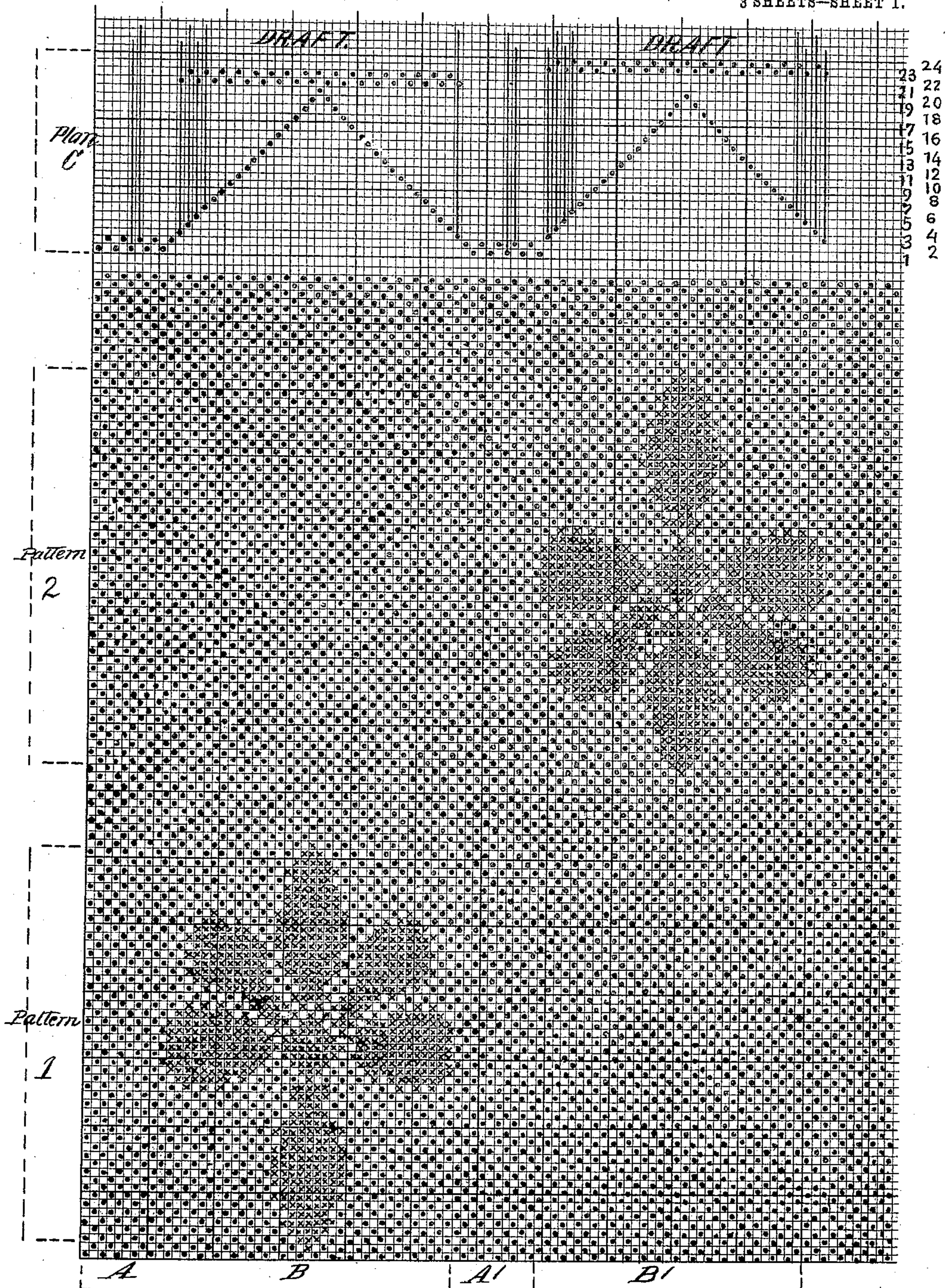


W. H. HARTLEY, DEC'D.
E. HARTLEY, ADMINISTRATRIX.
HEDDLE FOR LOOMS.
APPLICATION FILED APR. 22, 1907.

916,862.

Patented Mar. 30, 1909.

3 SHEETS—SHEET 1.



Witnesses:
E. F. Vniac
H. E. Pernick

DESIGN 1
Fig. 1

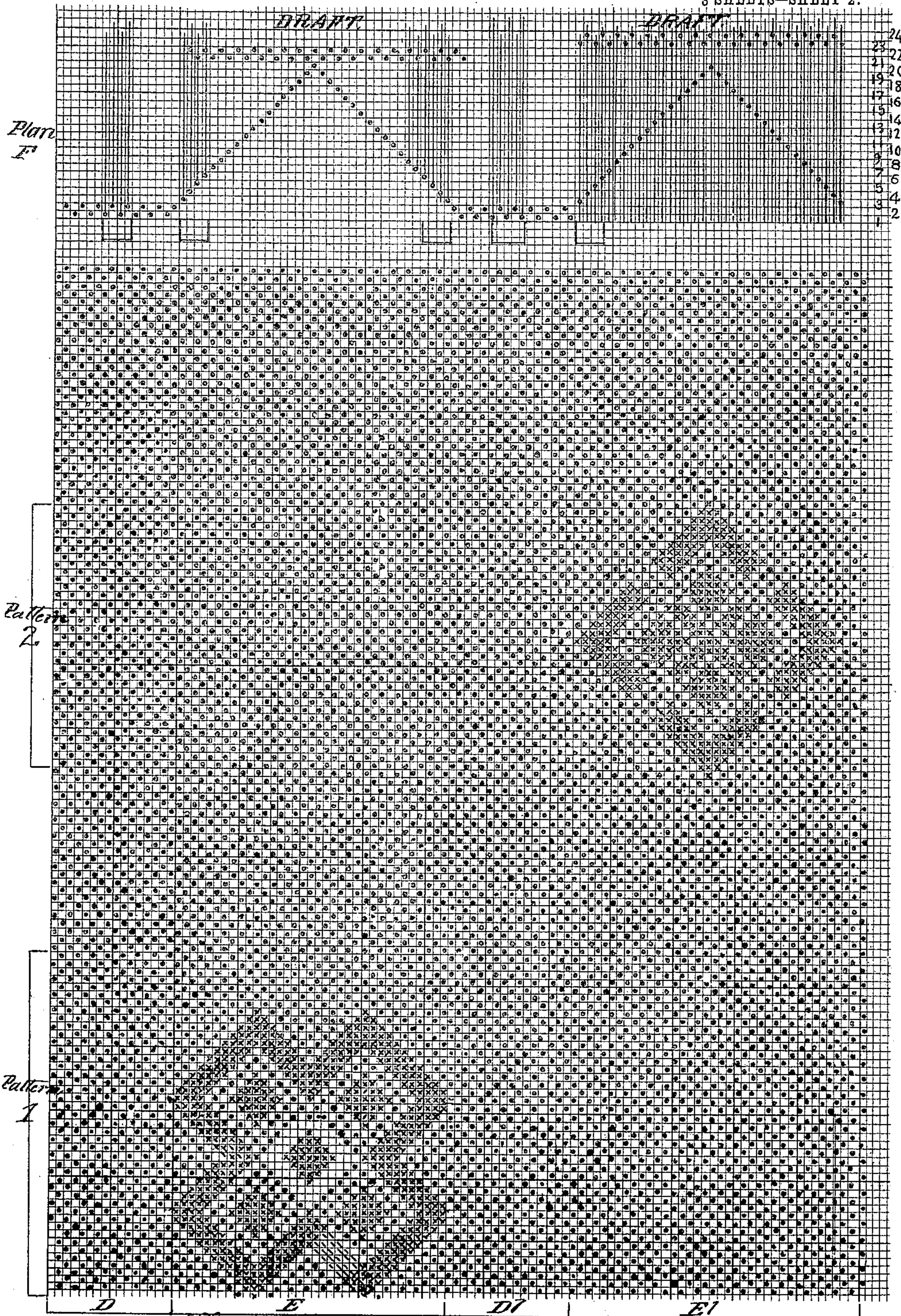
Inventor:
William H. Hartley
by his attorney
Charles F. Richardson

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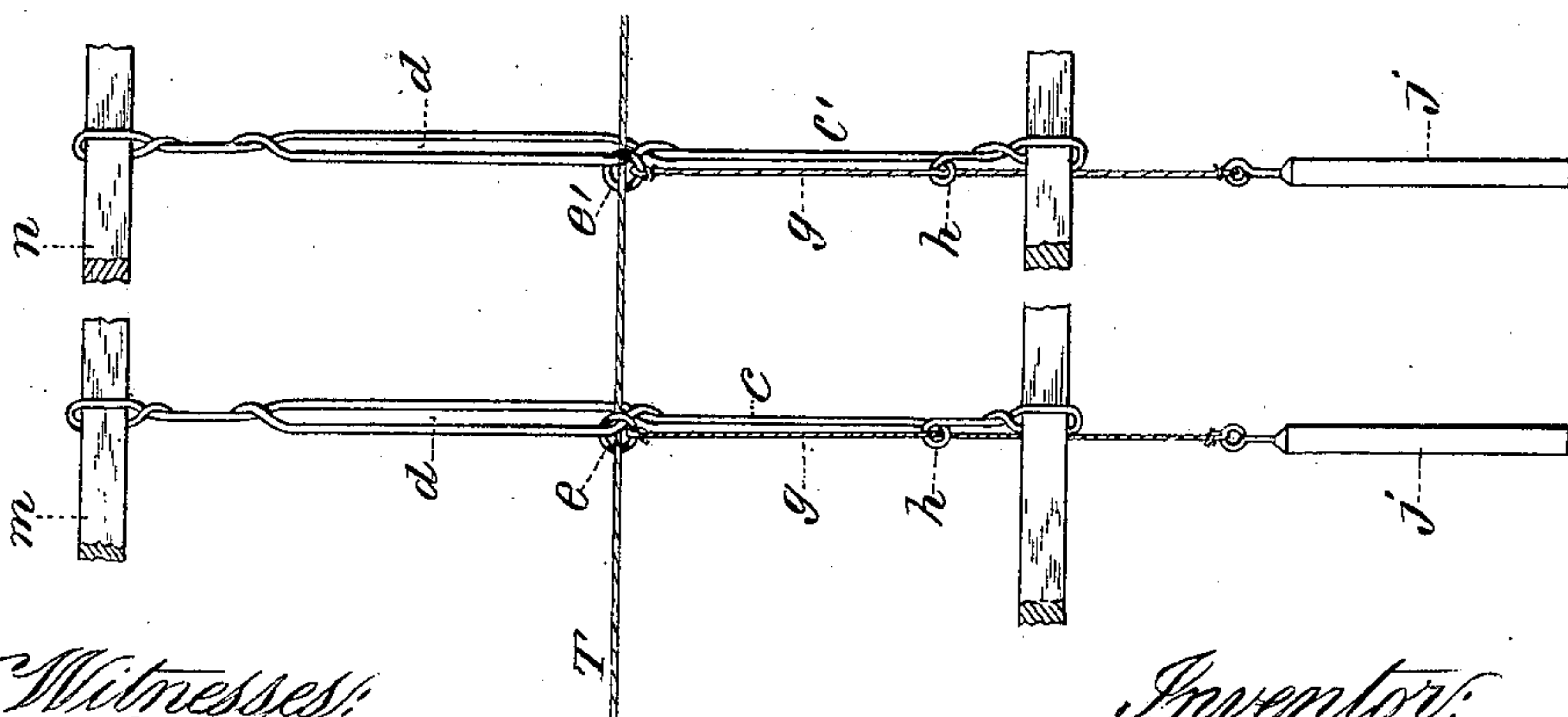
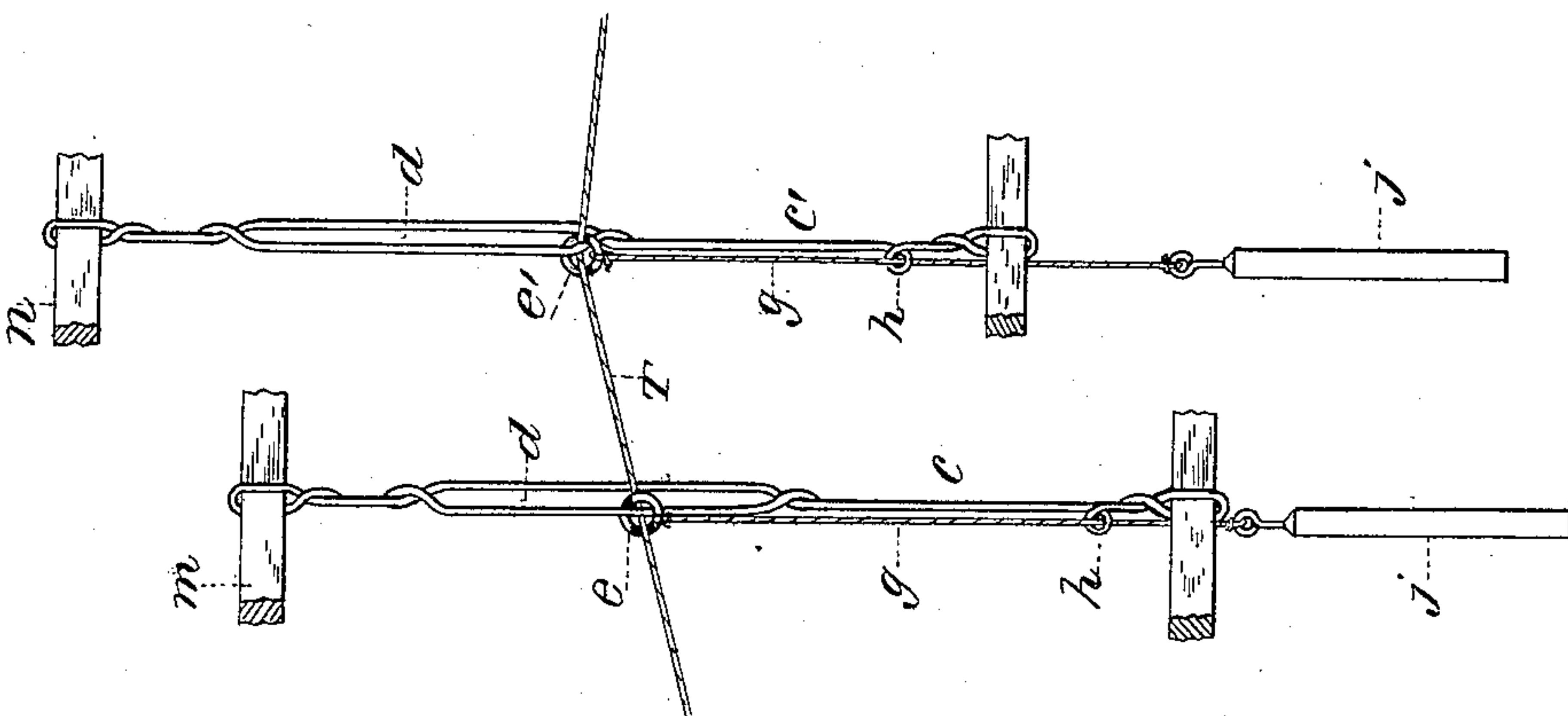
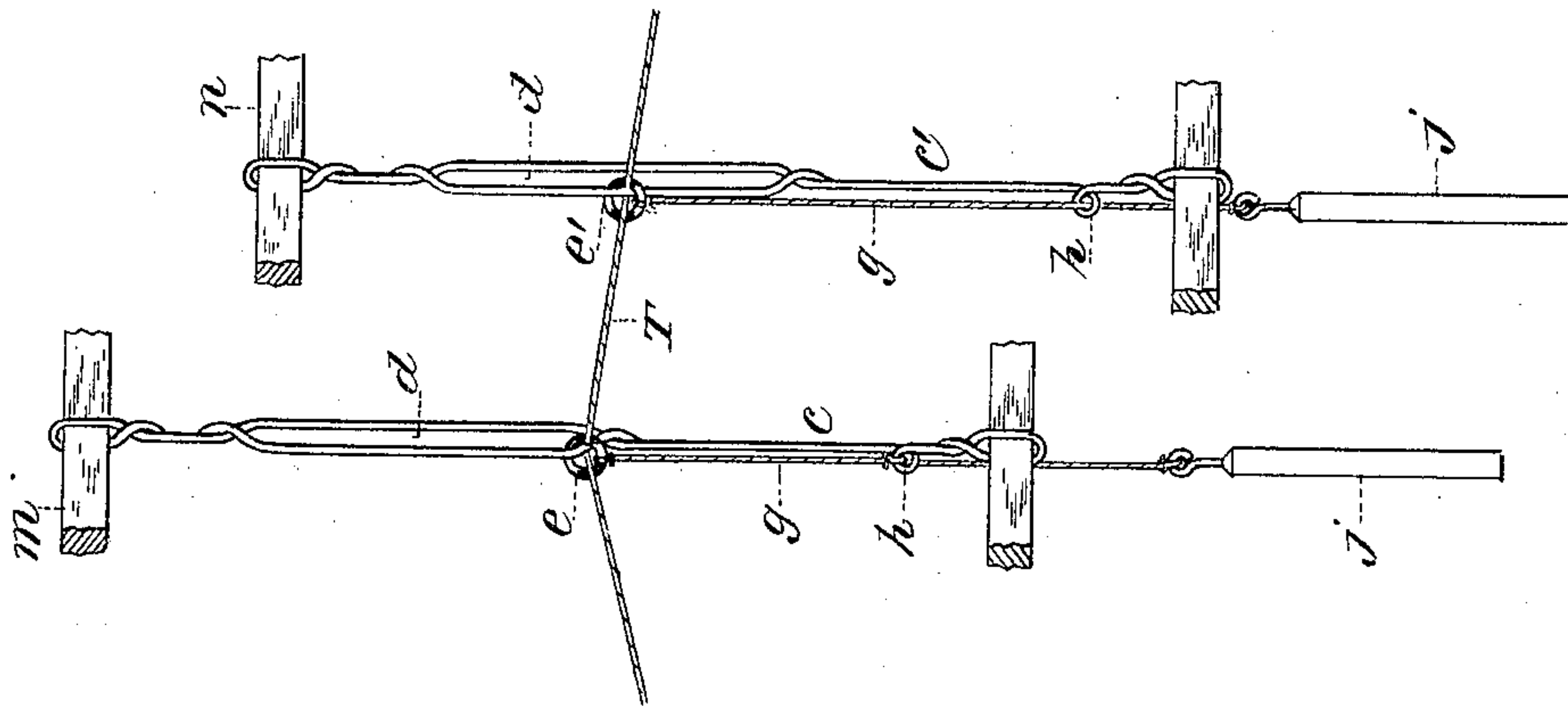
Witnesses: *E. F. Amiac* *Fig. 2* *DESIGN 2*
W. E. Fenwick *Inventor: William H. Hartley, by his attorney*
Charles S. Richardson

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3 SHEETS—SHEET 3.



Witnesses:
E. F. Amiac.
H. C. Penick.

Inventor:
William H. Hartley
by his attorney
Charles E. Richardson

UNITED STATES PATENT OFFICE.

WILLIAM H. HARTLEY, OF FALL RIVER, MASSACHUSETTS; EMILY HARTLEY ADMINIS-
TRATRIX OF SAID WILLIAM H. HARTLEY, DECEASED.

HEDDLE FOR LOOMS.

No. 916,862.

Specification of Letters Patent.

Patented March 30, 1909.

Application filed April 22, 1907. Serial No. 369,461.

To all whom it may concern:

Be it known that I, WILLIAM H. HARTLEY, a citizen of the United States of America, residing at Fall River, in the county of Bristol, State of Massachusetts, have invented certain new and useful Improvements in Heddles for Looms.

The objects of my invention are, to increase the capacity of a dobby machine; to produce various designs and patterns, one, two, three, or more times its present known capacity, without increasing the number of shafts; to produce designs and patterns heretofore considered impossible, except with a jacquard machine; to weave designs on any specified number of shafts, with the patterns placed in various different positions; or with the patterns themselves, each of a different character, and each one woven independently of the other, from the same shafts provided with my said improvements, thus enabling a dobby machine to produce more varied and much larger designs and patterns at a greatly reduced cost, as compared with the jacquard machine.

The particular construction employed by me, and the best embodiment of my invention now known to me, is shown in the following drawings, in which:

Figure 1 represents a design showing different weaves, and a drawing-in plan for said design; Fig. 2 represents another design, the patterns being different, and a drawing-in plan for said latter design; Fig. 3 represents my new heddles and a warp-thread there-through; all being in normal position; Fig. 4 represents the warp-thread operated by one heddle for one kind of weave, the other heddle being idle; while Fig. 5 represents the warp-thread operated by the other heddle for another kind of weave, the first heddle being idle.

The principal feature of my invention resides in means whereby a warp thread may be controlled by two or more shafts, said means being illustrated in Figs. 3, 4 and 5. A wire heddle *c*, has a long eye or slot *d*, on one side of which is attached a ring *e*; through this slot and ring, a thread *T* is drawn. Attached to this ring is a cord *g*, which is passed through a loop *h* formed on the lower part of the wire heddle *c*. Fixed to this cord is a lingo or small weight *j*. While I have described and illustrated the particular form of this feature of my inven-

tion, as constructed by and used by me, it is to be understood, that this feature may be embodied in other suitable material and in other forms. For example, the weighted means for controlling the movements of the thread relatively to its heddle, and its attachment to the thread may be varied; provided always that the heddle does not interfere with the up and down movements of the thread relatively to the heddle, and also that the thread always tends to move toward the bottom of the heddle.

To make use of my invention, the warp threads to be employed, are drawn in according to what I term a double system of drawing in, because every thread, as *T*, in the warp, which is to take part in forming the pattern, must be drawn in through two heddles, as *c*, *c'*, each heddle being on a shaft, as *m* or *n*. The long eye or slot *d* in each of these heddles, allows the thread to work freely in the eye of the slot, as in Figs. 4 and 5, so that the said thread *T* can be controlled and worked by either one of the said two shafts *m*, *n*, without interference with the other; thus every thread taking part in forming the pattern in the fabric, must be drawn through two heddles on two separate shafts, both heddles having the long eye or slot. To draw in a thread, as *T*, Fig. 3, it is drawn through the ring *e*, and slot *d*, of the heddle *c*, on the shaft *m*, and then through the ring *e'* and slot *d* on the heddle *c'* on the shaft *n*. When so drawn in, the thread is under the control or regulation of weights or lingoes *j* of the heddles *c*, *c'*, and under some circumstances the use of the two weights is necessary; but under others, one weight for each thread is enough. In connection with the designs shown in Figs. 1 and 2, one weight for each thread is sufficient.

In Fig. 1, I have shown how, with my new attachment, and method of drawing in the warp threads, the same pattern may be woven in two entirely different positions, and still be woven by the same shafts. In this design, the first ten threads *A* would be woven by shafts 1, and 2, plan C, not provided with my invention, because they are weaving plain. The threads, numbers 11 to 45 inclusive, section B, which are to form pattern 1 of the design and fabric, are drawn first through the long thread slots on the heddles on the specified number of shafts, viz. 18, and numbered 3 to 20 inclusive,

plan C, which produce the patterns on fabric; and second, through the heddles on shafts numbers 21 and 22, each heddle of which is provided with said slot, ring and weight to regulate its thread when the thread is moved by either one of the two heddles. For instance, to be more specific, thread number 11 would be first drawn down through the heddle on shaft number 21, having said attachment, then carried forward and drawn through the heddle on shaft number 3, provided with a long slot, but without the ring and weight. In the same way thread number 12 would be first drawn through the heddle having said slot, ring and weight on shaft 22, then carried forward, and drawn through the heddle provided with only the long slot of said attachment, on shaft number 4. This method or system of drawing in the warp threads would be continued with all the threads from number 11 to 45 inclusive; thus, in this case, every thread from number 11 to 46, of my design, section B, would be controlled by shafts, numbered 3 to 20 inclusive with only the long slot of said attachment, and also by shafts numbers 21, 22, provided with said attachment, so that to weave pattern 1 of the design, I would operate shafts numbers 3 to 20 inclusive, as in Fig. 5. After each of the threads to form pattern 1 of the design in the fabric, has been raised by any one of its respective shafts included in said shafts 3 to 20 inclusive, as in Fig. 5, it is regulated and brought downward relatively to the heddle into its normal or bottom position by means of said attachment, as in Fig. 3; that is, each thread is regulated and controlled by its ring, cord, and weight, after being raised by either of its shafts. As already stated, only one of the two weights *j* is necessary to control each warp thread in weaving the patterns in designs 1 and 2. Then, to weave the plain or any other weave, which is in a direct line with the pattern, I would operate shafts numbers 21, 22, which are provided with said attachment; the shafts numbered 3 to 20 inclusive, remaining inoperative, when the threads are controlled to weave a plain or other weave, by the heddles 21, 22, having my attachment.

In my design 1, I have shown that not only patterns in reverse positions, patterns 1 and 2, but also patterns in different positions, can be woven by the same given shafts when use is made of said attachment, and the threads are drawn in as described; whereas by any other heretofore known means, a separate and different series of shafts would be required to weave each pattern. Thus, to weave pattern 1, there would be required 18 shafts; also another separate series of 18 shafts for pattern 2; and also four separate shafts to produce the plain weave; a total of 40 shafts. The same, or better results are

obtained on 24 shafts supplied with my invention.

To weave the rest of the design shown in Fig. 1, threads 46 to 55 section A', would be controlled by shafts 1 and 2, draft plan C, for plain weaving, and threads 56 to 90 inclusive, section B', which form the weave for the second pattern 2, section B' in the design, would be controlled by shafts 3 to 20 inclusive, which are the same shafts employed to weave pattern 1, section B, Fig. 1. These threads 56 to 90 inclusive are also controlled by shafts 23, 24, section C. To draw in the latter part of the design, thread 56, section B', is first drawn through the heddle on shaft 23, having my attachment, and then carried forward and drawn through the slot in heddle on shaft 3, as before; the slots allowing the thread to be controlled either by shaft 3 or shaft 23, as called for by the design, section B. Thread 57 would be first drawn through the heddle on shaft 24, and then carried forward and drawn through the heddle on shaft 4; and so on with all of the threads up to and including shaft 20, and back again to shaft 3. In this way, the threads 56 to 90 inclusive may be operated by two sets of shafts, each set working or weaving independently of the other. When weaving the plain weave for section B, design 1, shafts 21 and 22 would be operated; and when weaving pattern 1, section B, I should operate shafts 3 to 20, and shafts 21 and 22 would be inoperative; while, when weaving the plain weave, section B', in line with the pattern 1, section B, shafts 23 and 24 would be operated; and when weaving the pattern 2 itself, I should operate shafts 3 to 20 inclusive, as in weaving pattern 1; shafts 21 and 22 being operated at the same time to produce a plain weave in line with the pattern 1, section B'. Where the whole design 1, shown in Fig. 1, is to be woven, then shafts 3 to 20 inclusive will weave both of the patterns; and further, while there is being woven one of the patterns and so much of the design as is opposite thereto and is a plain weave, and does not include the plain weave of sections A and A' woven by the heddles 1, 2, it is obvious that while the pattern as 1 is being woven by the shafts 3 to 20 inclusive, the long thread slots, in the heddles on the shafts 3 to 20 inclusive and through which are drawn all of the threads in section B', permit the shafts 23 and 24 to be moved to weave the plain weave opposite pattern 1, while said shafts 3 to 20 inclusive are weaving the pattern 1 of the design.

In my design 2, Fig. 2, I have used the same number of shafts drawn in in the same method, as for design 1. By using 16 plain threads D, I have shown how these plain threads may be increased to any number, as called for by the design or fabric to be woven, without increasing the number of shafts.

Also, my design 2 shows two entirely different patterns. With any heretofore known method these two patterns could not be produced in woven fabric with less than 38 shafts on a dobby machine. Practically, they would require a jacquard machine for their production.

By the use of my invention, warp threads may be used for fancy weaves and designs for various textile fabrics, such as silks, cottons, woolens, linens, napkins, handkerchiefs, tidies, and the like.

Having described my invention, and knowing that it may be embodied in different forms without departing from the spirit thereof, I desire to protect it in the broadest manner legally possible.

What I claim is:—

1. In a heddle for a warp thread, means whereby the warp thread may have free but limited up and down movements in relation to the heddle; and means operatively connected to said thread, always tending to overcome the upward movements of said thread.

2. In a heddle for a warp thread, means designed to engage the warp thread, and constantly tend to hold the warp thread in its lowest position in relation to its heddle.

3. In a heddle for a warp thread, weighted means to engage said thread, and always tend to hold the warp thread in its lowest position, in relation to the heddle.

4. In a heddle for a warp thread, means mounted on said heddle and adapted to receive the warp thread therethrough; a cord secured to said means; and a weight suspended from said cord; all designed to move the said thread downward relatively to the heddle and to tend to hold it in its lowest relative position.

5. A wire heddle having a thread slot, and means mounted on the side of said slot, to engage a warp thread passing through said slot, and move it downward.

6. A wire heddle having a thread slot; a thread ring mounted on the wire side of said slot; and a weight suspended from said ring to tend to hold the thread at the bottom of said slot.

7. A wire heddle having a thread slot; a thread ring mounted on the wire side of said slot; a weight suspended from said ring to tend to hold the thread at the bottom of said slot; and a guide for the weight.

8. A heddle provided with a slot for a warp thread; and a second heddle having a thread

slot for said warp thread, and weighted means to engage the said thread, and constantly tend to move it downward and back to its lowest position relative to the heddle, when the thread is raised by the other heddle through which the said thread has been drawn.

9. Two heddles through which a warp thread may be drawn, each heddle having a slot for said thread, whereby the thread may be freely moved by one heddle without interference by the other heddle through which the said thread is drawn; and also having weighted means to engage said thread and constantly tend to move it downward when relatively to its heddle, it is raised by the other of said heddles.

10. A series of heddles to control a series of warp threads, to weave designs of various patterns, each heddle being provided with a thread slot; and a series of heddles to control the same warp threads to weave different ground weaves, each heddle having weighted means to engage its respective warp thread, and constantly tend to move it back to the bottom of the thread slot, its normal position; all designed so that the same series of threads may be used to produce different patterns and ground weaves in succession.

11. A series of heddles provided with thread slots to control a series of warp threads to weave patterns; a second series of heddles to control a portion of said series of warp threads, so that said portion of warp threads may be employed in weaving a weave different from that of the pattern weave, each heddle being provided with weighted means to engage its respective warp thread and constantly tend to hold said thread in its lowest position in relation to its heddle; a third series of heddles to control another portion of said series of warp threads to weave another pattern, each of said heddles being provided with weighted means constantly tending to hold its individual warp thread in its lowest position in relation to its heddle; all being so combined that a pattern weave and a different weave may be simultaneously woven in line.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. HARTLEY.

Witnesses:

RICHARD P. BORDEN,
MAUD B. PLUMMER.