

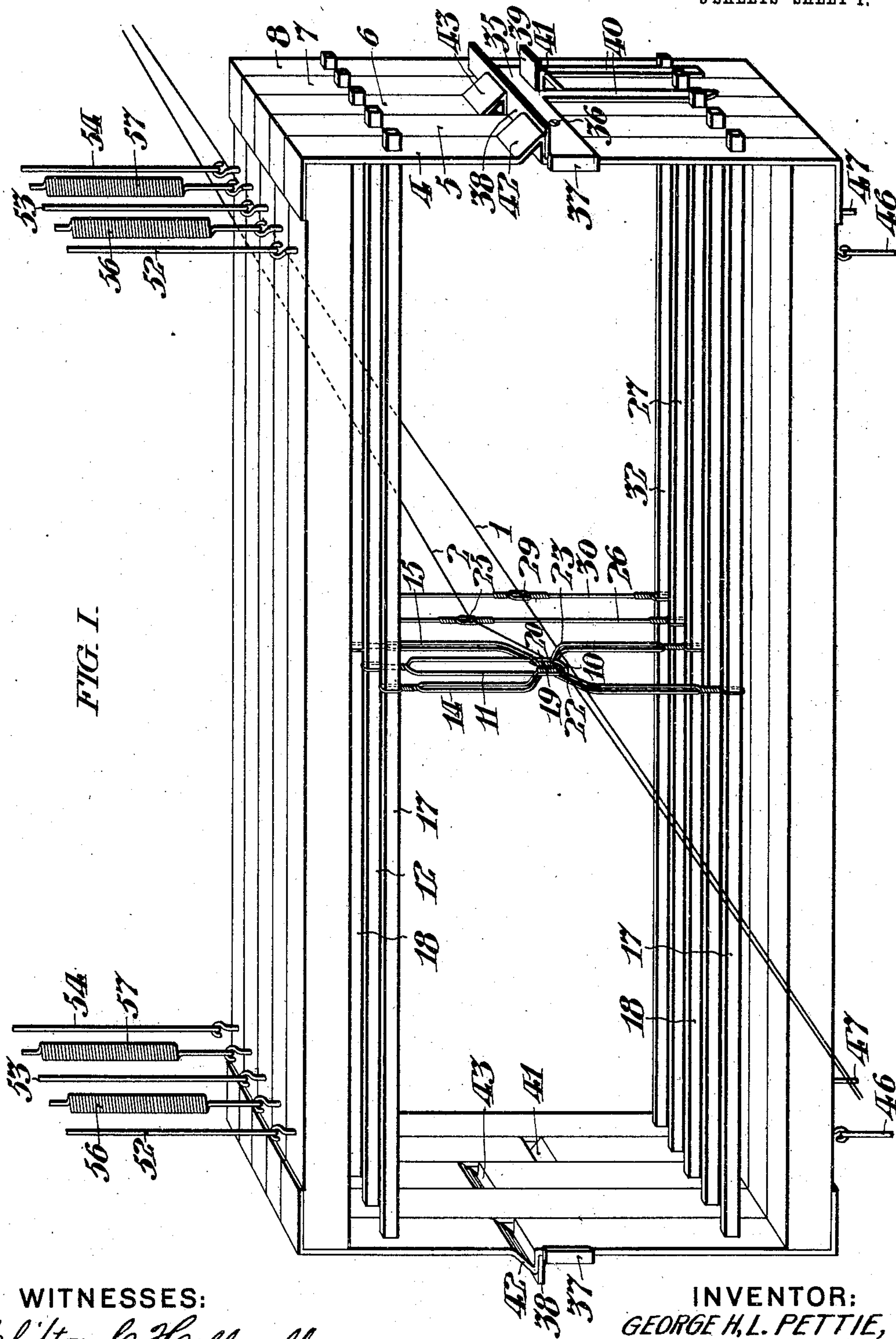
No. 788,328.

PATENTED APR. 25, 1905.

G. H. L. PETTIE.  
LOOM FOR CROSS WEAVING.

APPLICATION FILED MAY 7, 1904.

3 SHEETS—SHEET 1.



WITNESSES:

*Clifton C. Hallowell*  
*John C. Berger*

INVENTOR:

GEORGE H. L. PETTIE,

*by* *Paige, Paul & Foley*  
*Atty's.*

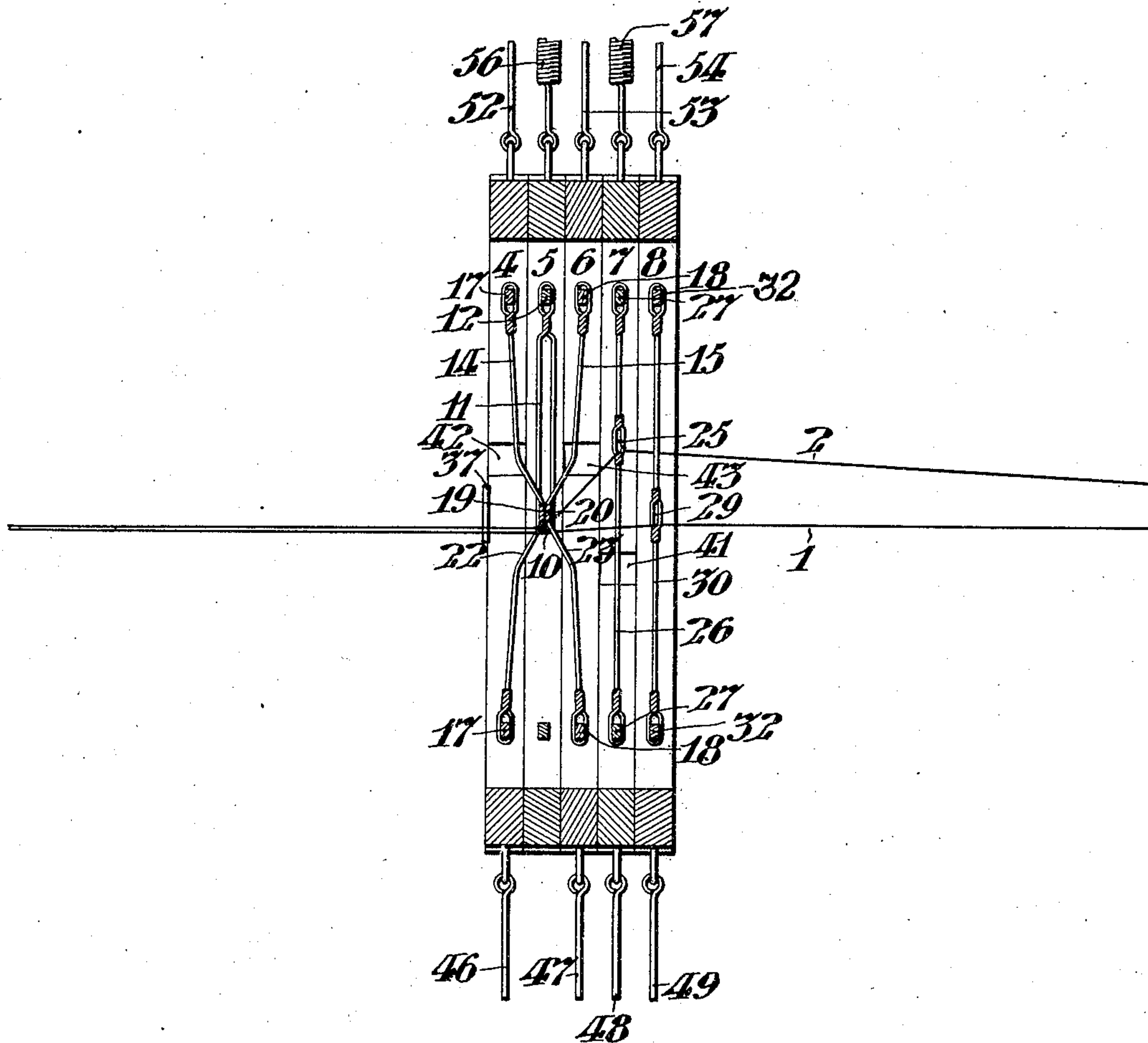
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FIG. II.



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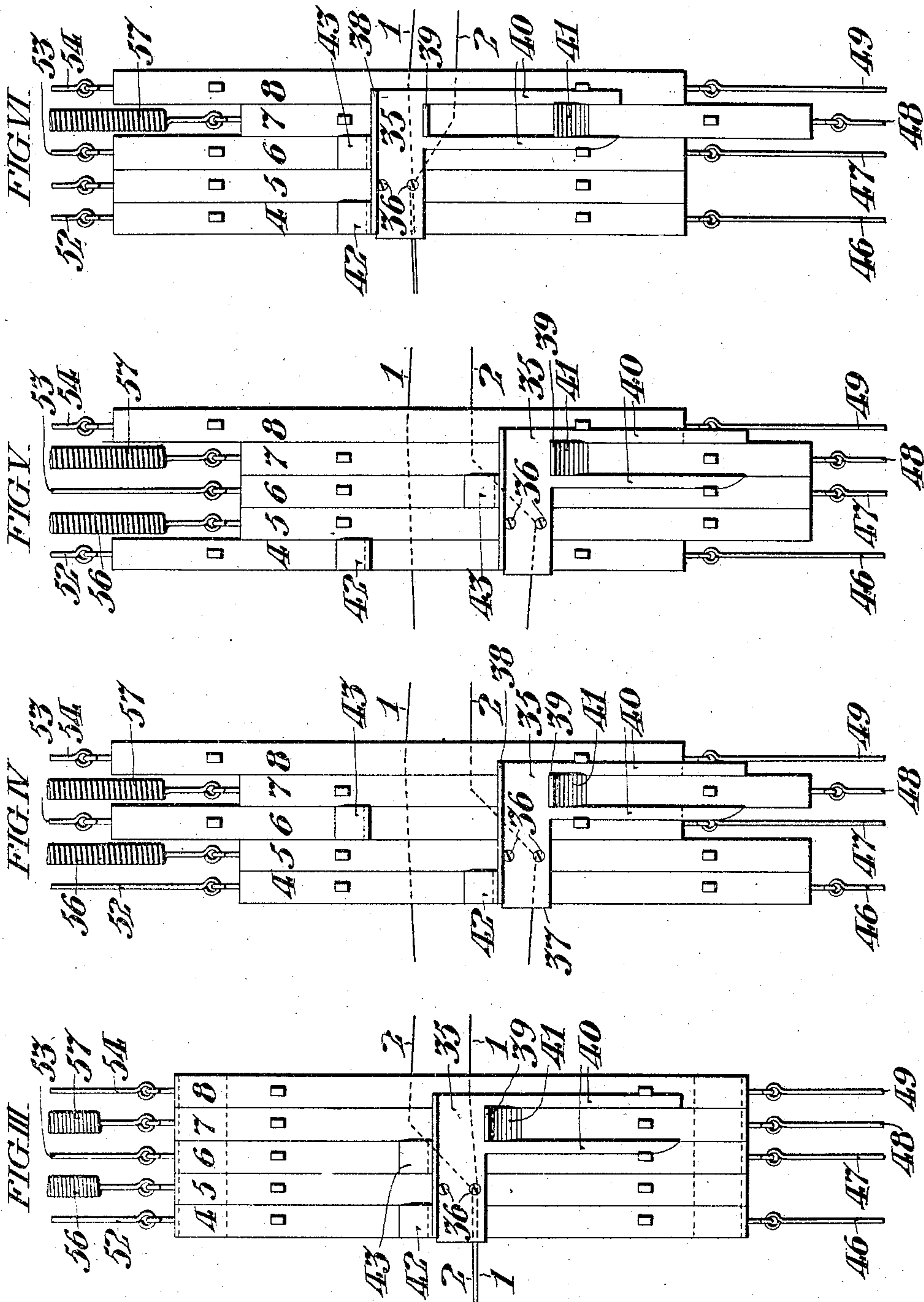
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3 SHEETS—SHEET 3.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

GEORGE H. L. PETTIE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO  
RICHARD H. AIMAN, OF PHILADELPHIA, PENNSYLVANIA.

## LOOM FOR CROSS-WEAVING.

SPECIFICATION forming part of Letters Patent No. 788,328, dated April 25, 1905.

Application filed May 7, 1904. Serial No. 206,809.

*To all whom it may concern:*

Be it known that I, GEORGE H. L. PETTIE, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Looms for Cross-Weaving, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to what are known as "doup-heddle" mechanisms. It is usual to employ in such mechanisms heddle-shafts having central eyes for the doup-threads and automatically-operative oscillatory tension-bars which engage the doup-thread adjacent to the warp-beams, so as to yield and prevent the detrimental strains upon the latter which would otherwise be caused during the shedding operation.

It is the object of my invention to avoid such strains upon the doup-threads and incidentally to dispense with the tension devices aforesaid. To this end I provide a group of heddle-shafts, one of which comprises eyes for the doup-threads disposed a substantial distance above the normal central position of the usual eyes, so that when the other members of said group of heddle-shafts are disposed with their central eyes in horizontal alinement with the plane of the fabric the doup-threads are upheld by said special shaft above the level of the fabric, and when the doup-threads are lowered they are slackened instead of being strained, as in devices of the prior art.

My invention comprises the various novel features of construction and arrangement hereinafter more definitely specified and claimed.

In the accompanying drawings, Figure I is a perspective view showing a convenient embodiment of my invention comprising five heddle-shafts. Fig. II is a vertical sectional view taken through the mechanism shown in Fig. I on a plane parallel with the warp-threads. Figs. III, IV, V, and VI are right-hand end views of the group of shafts shown in Fig. I disposed in respectively different positions, indicating corresponding steps in the shedding operation.

For clearness of illustration I have shown in Figs. I and II but a single ordinary warp-thread 1 and a single doup-thread 2, although it is of course to be understood that any desired number of such threads may be employed. The five shafts are numbered, respectively, 4, 5, 6, 7, and 8, the first-named being adjacent to the lay. Said shafts 4, 5, and 6 are arranged to cooperate in twisting the doup-thread 2, which extends through the eye 10 at the end of the depending wire bight 11, which is carried by the cross-bar 12 in the shaft 5. Said bight 11 is engaged by the wires 14 and 15, which are respectively carried by the shafts 4 and 6 and have the loops in their upper and lower ends secured to the cross-bars 17 and 18 of said shafts. As best shown in Fig. I, the wires 14 and 15, respectively, local to the shafts 4 and 6, each comprise two strands, which are twisted together at their central portions 19 and 20, so as to embrace the opposite side strands of the bight 11. As best shown in Fig. II, said wires 14 and 15 are provided with offsets 22 and 23 immediately adjoining the eye 10 of said bight 11, so that the warp-thread 1, which extends between said wires 14 and 15, as indicated in Fig. I, is normally maintained below said eye 10. It is to be understood that the arrangement above described is such that in the relative reciprocation of said three shafts 4, 5, and 6 the warp-thread 1 is twisted alternately from one side to the other of the doup-thread 2 as said wires 14 and 15 are alternately raised to permit said thread 1 to rise above the doup-thread 2, held down by said eye 10. The doup-thread 2 passes to the eye 10 in the bight 11 from the eye 25 in the wire 26, which latter is supported by the cross-bars 27 of the shaft 7 extending through its opposite end loops, said eye 25 being eccentrically located between said loops. The warp-thread 1 passes between said wires 14 and 15 from the eye 29 in the wire 30, which latter is secured by its opposite end loops to the cross-bars 32 of the shaft 8. In the shedding operation said shafts 4, 5, 6, 7, and 8 assume the several positions shown, respectively, in Figs. III to VI, inclusive, although not necessarily in that par-



ticular order, and it may be noted that Fig. II corresponds with what may be termed the "normal" position of said devices. (Shown in Figs. I and III.)

5 In Fig. IV the shafts 4, 5, and 7 are lowered and the shafts 6 and 8 are raised, with the effect that the warp-thread 1 is twisted around the doup-thread 2, being drawn up on the side of the eye 10, shown as the right-hand side in Fig. II. In Fig. V the shafts 10 4 and 8 are raised and the shafts 5, 6, and 7 are lowered, with the result that the warp-thread 1 is twisted upon the opposite side of the doup-thread 2 to that characteristic of the 15 position shown in Fig. IV, viz: It is drawn up on the side of the eye 10, shown as the left-hand side in Fig. II. In the position shown in Fig. VI all of the shafts 4, 5, 6, and 8 are raised and the single shaft 7 lowered, 20 with the effect that the doup-thread 2 is slackened by the eye 25 in the shaft 7 being presented in substantially the same relation below the eye 10 in the shaft 5. It may be here again noted that if said eye 25 were in the 25 normal position or at the normal level—viz., at the center of the vertical height of the shaft 7 or arranged to coincide with the plane of the fabric when said shaft is intermediate of its vertical movement—when said shaft assumed the relative position shown in Fig. VI 30 said doup-thread 2 would be strained and would require such relief as has hitherto been afforded by automatic tension devices.

In order to insure the positive actuation of 35 the shafts 5 and 7 in the definite relation above specified and shown in Figs. III to VI, inclusive, I provide the shaft 5 with end plates 35, which are conveniently secured thereon by screws 36. Said plates 35 are each 40 provided with an end flange 37, which overlaps the shaft 4, an upper horizontal flange 38, and a lower flange 39. Said plates 35 are also conveniently provided with depending guide members 40, which embrace the lugs 41 45 on the opposite ends of the shaft 7 and guide the shafts 6 and 8 in parallel relation. However, said guides 40 may be omitted. The shafts 4 and 6 are respectively provided upon their opposite ends with projecting lugs 42 50 and 43, arranged to encounter said flanges 38 on the opposite end plates 35, so that said shafts 4 and 6 are positively uplifted when the shaft 5 is uplifted, as shown in Fig. VI. The shaft 7 is positively lowered by said 55 plates 35 when the shaft 5 is lowered, as shown in Figs. IV and V, the lugs 41 on said shaft 7 being encountered by said flanges 39 on the plates 35. The interengaging operation of said plates 35 is advantageous in that it minimizes the number of shifting devices required 60 for controlling the group of shafts—that is to say, it is only necessary to provide the shafts 4, 6, 7, and 8 with connections 46, 47, 48, and 49, by which they may be positively

drawn down, said shafts 4, 6, and 8 being pro- 65 vided with connections 52, 53, and 54, by which they may be positively raised, and said shafts 5 and 7 being suspended upon springs 56 and 57. Although I find it convenient to employ said plates 35, above described, for 70 the reasons stated, it is obvious that they are not essential to the operation of the heddle-shaft 7, having its eyes 25 in abnormal position, which is the characteristic feature of my invention. Moreover, it is to be understood 75 that I do not desire to limit myself to the particular construction and arrangement described, as it is obvious that various modifications may be made therein without departing from the essential features of my inven- 80 tion.

I claim—

1. In a loom, the combination with heddle-shafts respectively having eyes for the ordinary warp-threads and for the doup-threads; 85 of a heddle-shaft having eyes for the doup-threads located above the normal level specified, and arranged to relax said threads at the lower limit of their shedding movement, substantially as set forth. 90

2. In a loom, the combination with a heddle-shaft having eyes for doup-threads at the normal level, supported by wire bights; of two shafts respectively arranged upon the opposite sides of said first shaft, having offset wires 95 engaged with the respectively opposite strands of said bights; a fourth shaft having eyes for the doup-threads located above the normal level; and, a fifth shaft, arranged between said fourth shaft and the warp-beam, having eyes 100 for the ordinary warp-threads at the normal level, substantially as set forth.

3. In a loom, the combination with heddle-shafts respectively having eyes for the ordinary warp-threads and for the doup-threads, 105 at the normal level specified; of a shaft having eyes for the doup-threads located above the normal level, and arranged to relax said threads at the lower limit of their shedding movement, substantially as set forth. 110

4. In a loom, the combination with heddle-shafts respectively having eyes for the ordinary warp-threads and for the doup-threads, 115 at the normal level specified; of a shaft having eyes for the doup-threads located above the normal level, and arranged to relax said threads at the lower limit of their shedding movement; end plates secured in stationary position upon one of said shafts; and, lugs 120 projecting at the ends of another of said shafts arranged to encounter said plates; whereby, said shafts may be shifted in definite relation, substantially as set forth.

5. In a loom, the combination with heddle-shafts respectively having eyes for the ordi- 125 nary warp-threads and for the doup-threads, at the normal level specified; of a shaft having eyes for the doup-threads located above

the normal level, and arranged to relax said  
threads at the lower limit of their shedding  
movement; vertical end bars of metal on three  
of said shafts, having lugs projecting in the  
5 plane of said shafts; and, means carried by  
another of said shafts to engage said lugs to  
shift said shafts, substantially as set forth.

In testimony whereof I have hereunto signed  
my name, at Philadelphia, Pennsylvania, this  
5th day of May, 1904.

GEORGE H. L. PETTIE.

Witnesses:

ARTHUR E. PAIGE,  
HERBERT S. LANDELL.