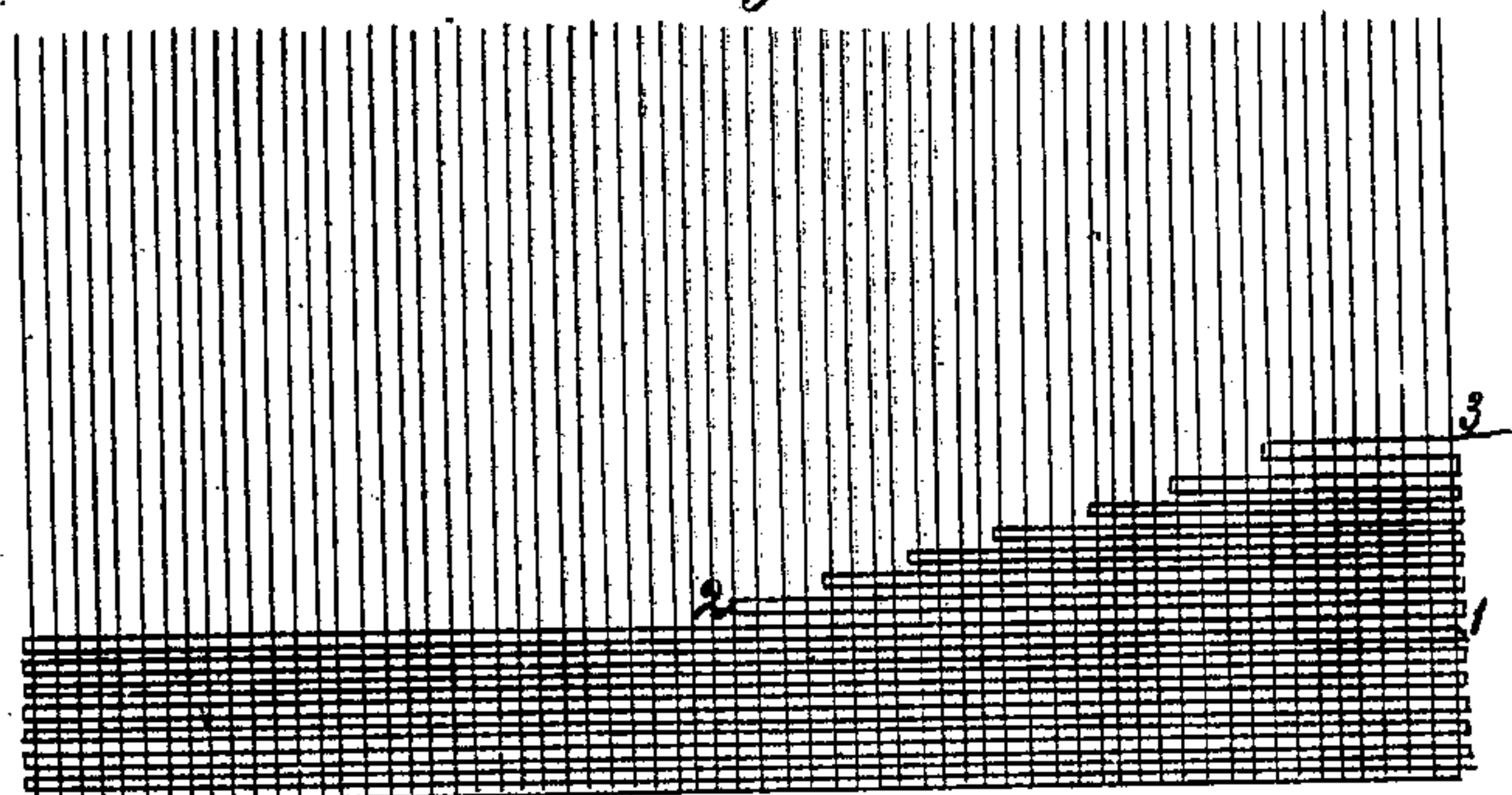
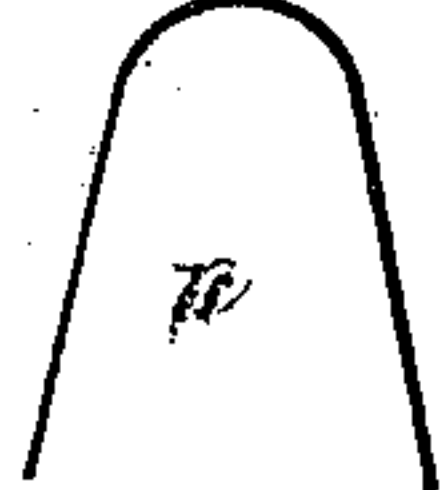
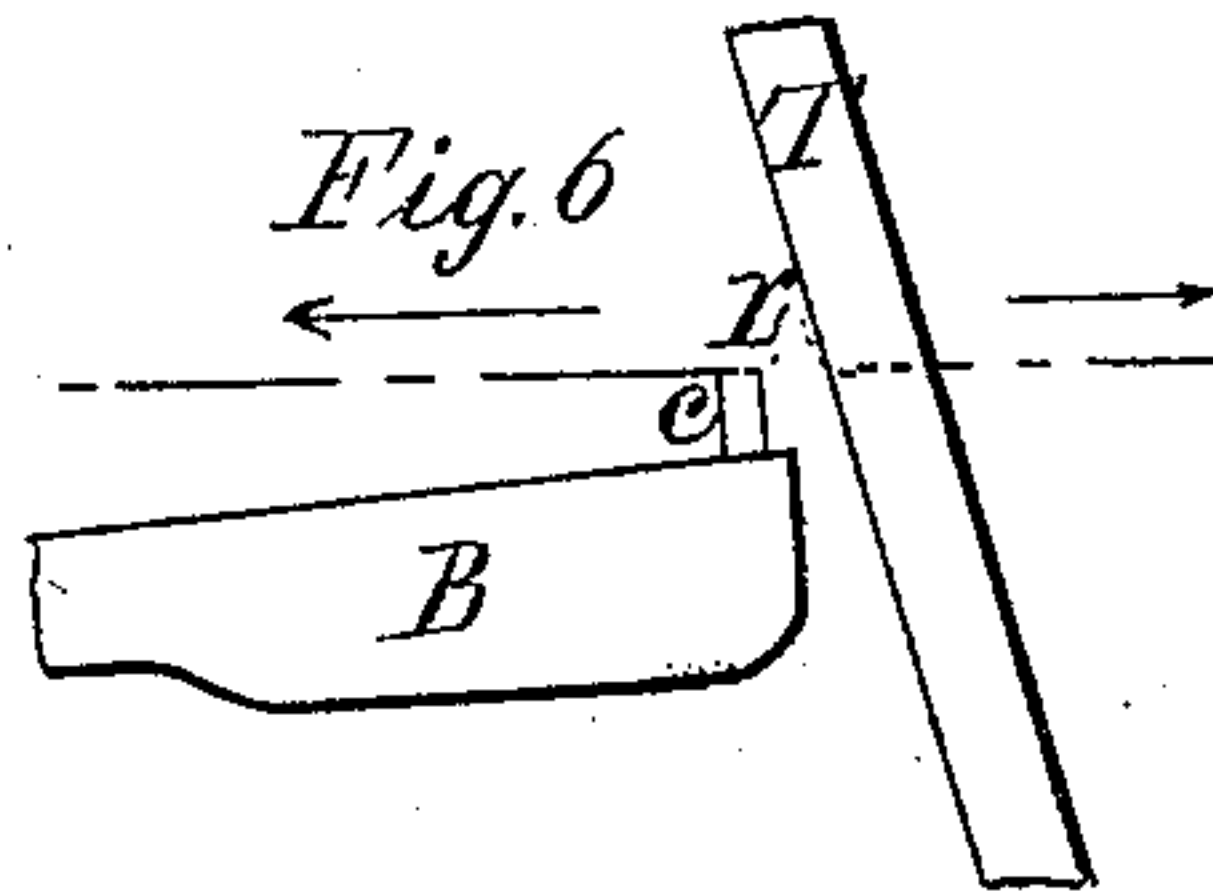
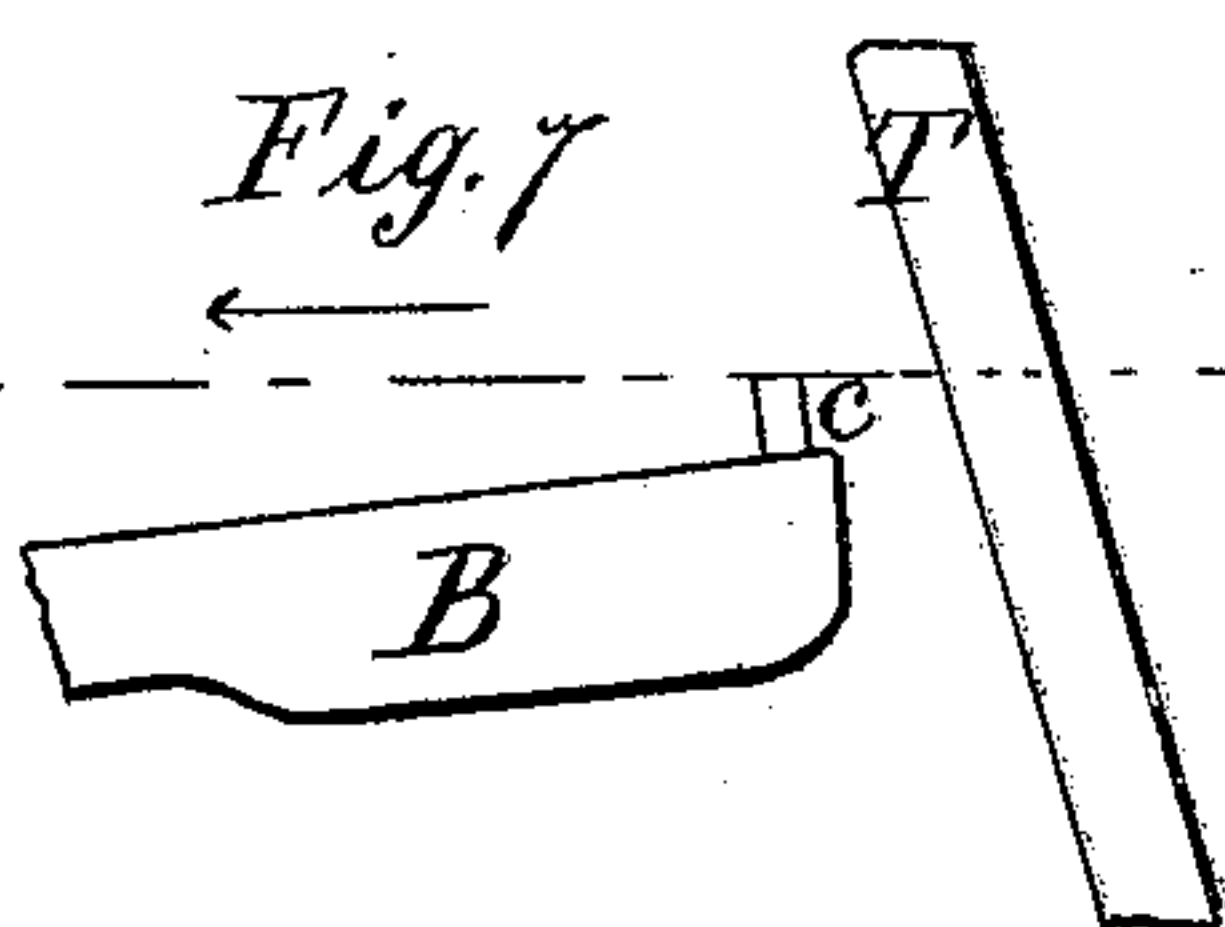
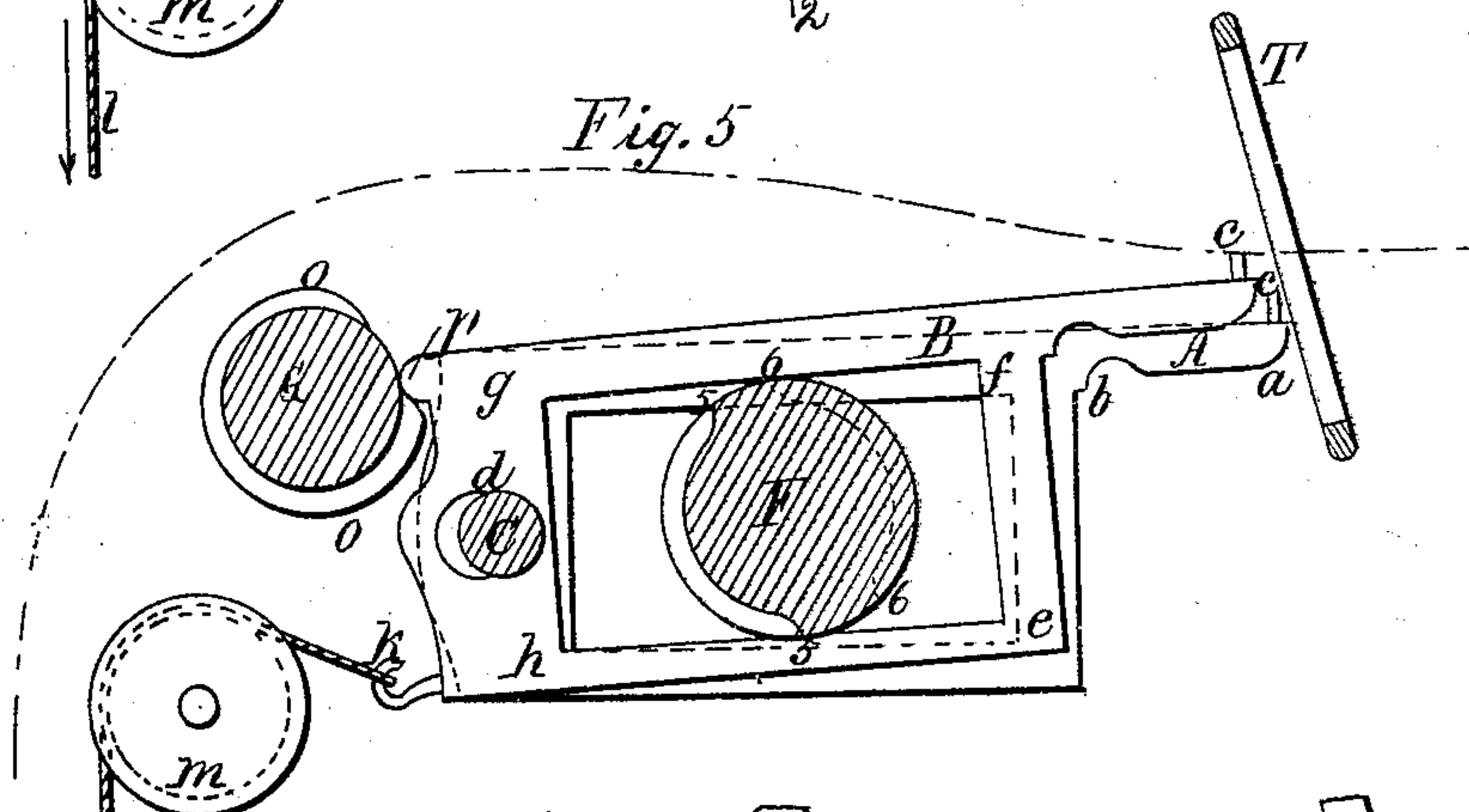
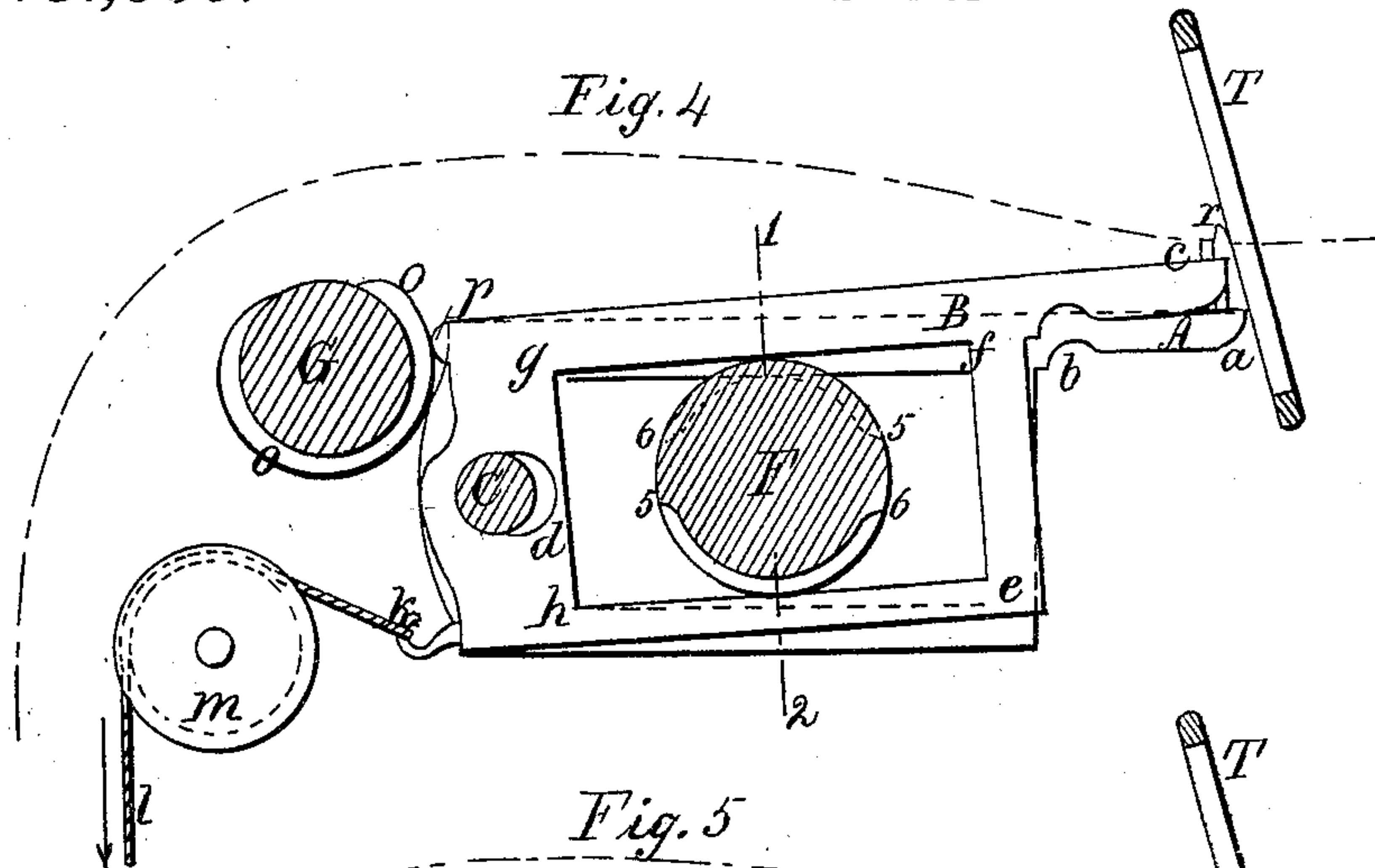


*A. Coullion.*

## *Irregular Weaving.*

*N<sup>o</sup> 101,006.*

*Patented Mar. 22, 1870.*



Witnesses.

Annally  
C. Harvey

*Inventor.*

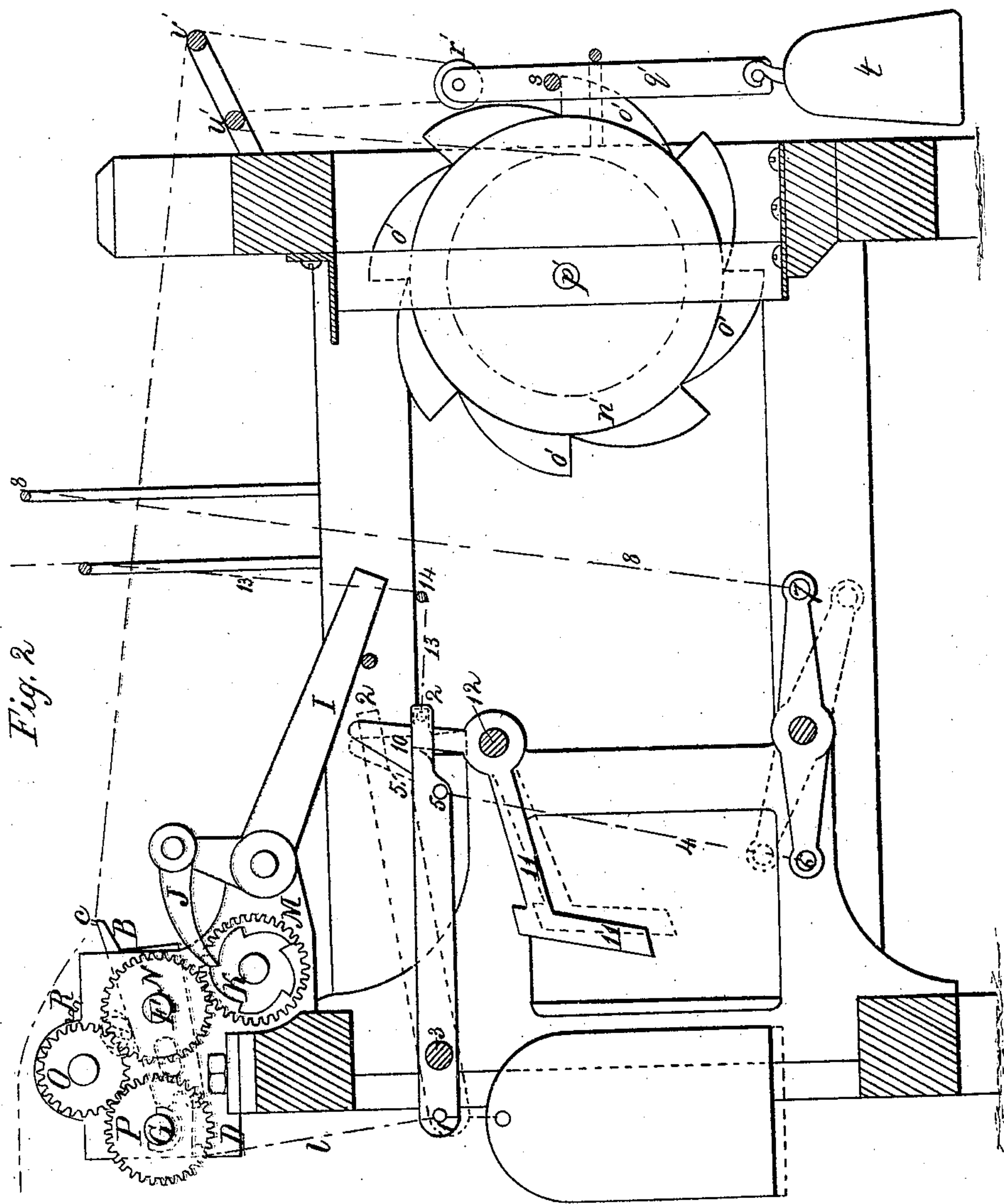
Yours truly,

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*A. Goulliond.*  
*Irregular Weaving.*

*N<sup>o</sup> 101,006.*

*Patented Mar 22, 1870.*



*Witnesses.*  
*C. Brundage*  
*B. Haney*

*Inventor.*  
*Goulliond*

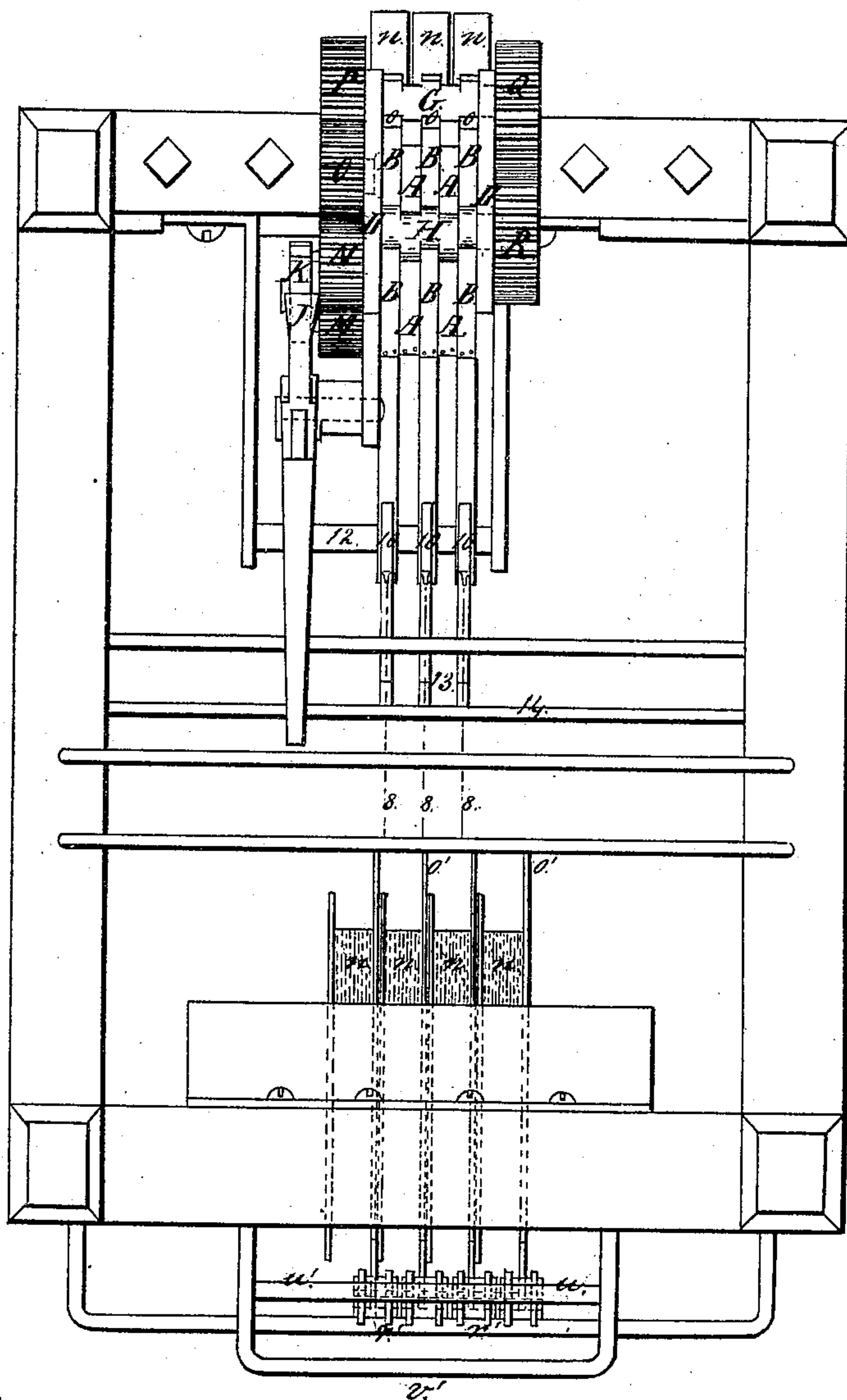
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*A. Goullioud.*  
*Irregular Weaving*

*N<sup>o</sup> 101,006.*

*Patented Mar. 22, 1870.*

*Fig: 3.*



*Witnesses,*  
*A. B. Mille*  
*B. H. H. H.*

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*Goullioud*

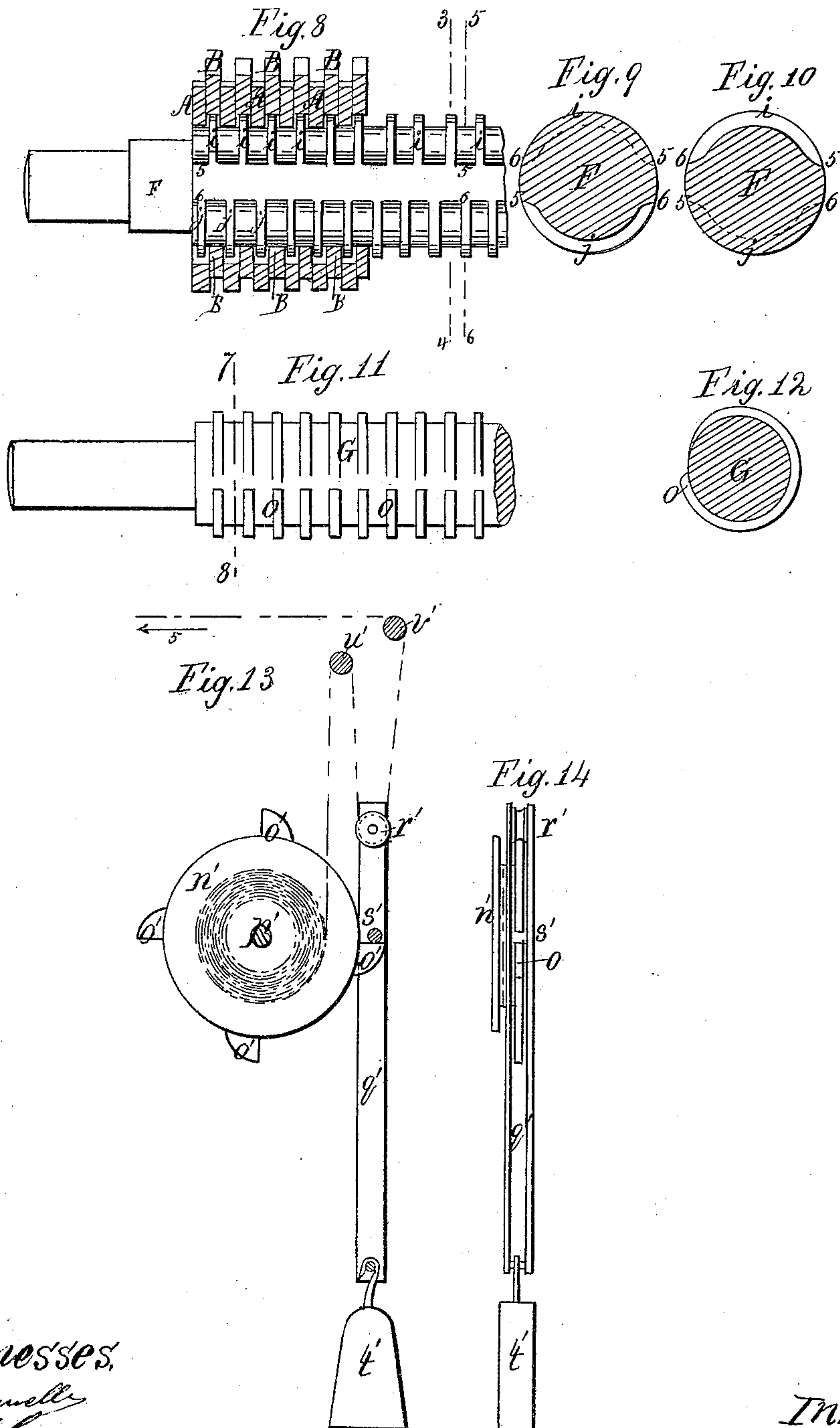


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# A. Goulliond. Irregular Weaving.

N<sup>o</sup>: 101,006.

Patented Mar. 22, 1870.



Witnesses,  
C. Brunell  
B. Haney

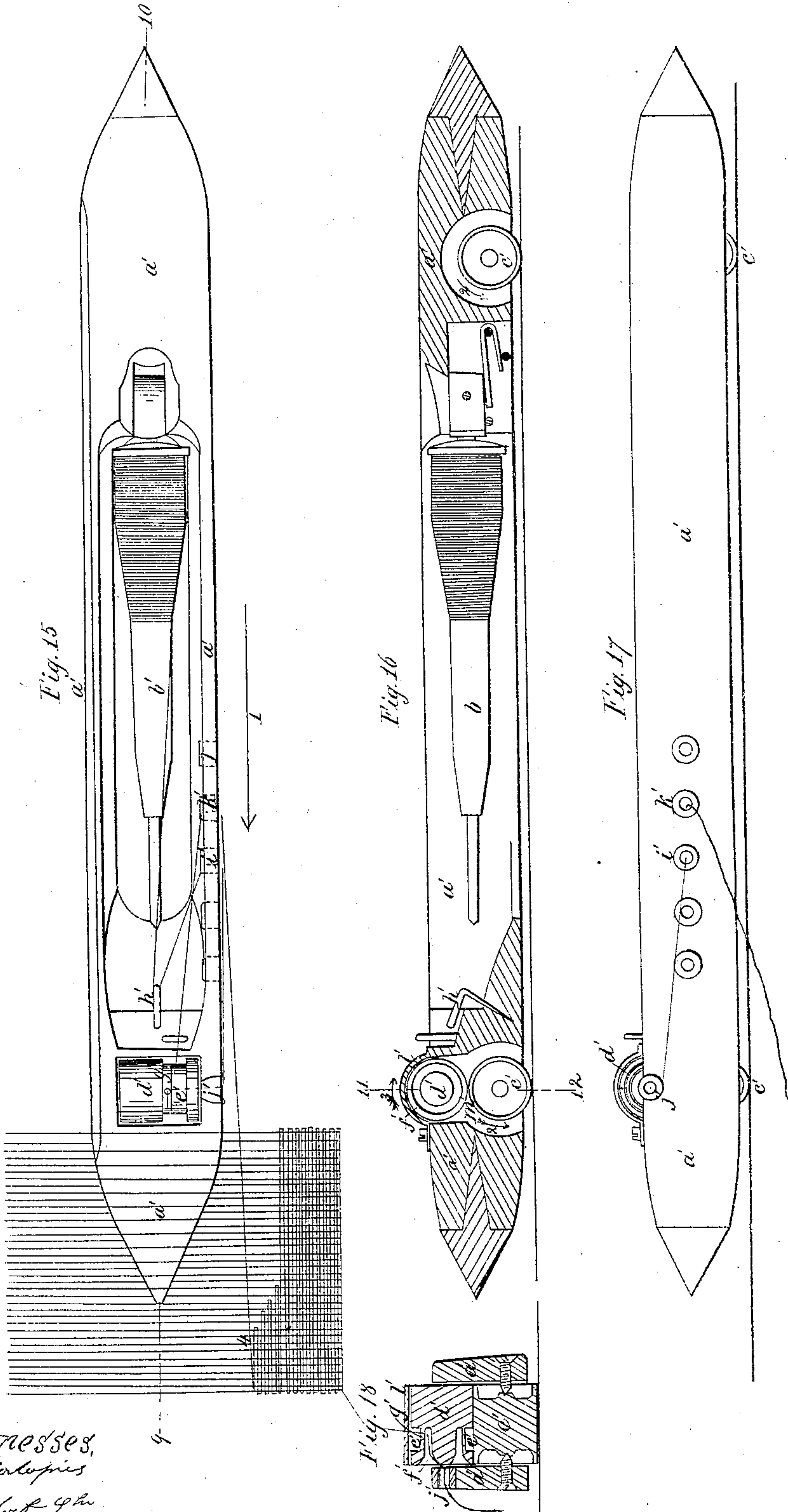
Inventor,  
Goulliond.

*A. Goullioud.*  
*Irregular Weaving.*

*Sheet 5-5 Sheets.*

*N<sup>o</sup> 101,006.*

*Patented Mar. 22, 1870.*



*Witnesses,*  
*Charles G. Goullioud*

*Inventor,*  
*A. Goullioud*



# United States Patent Office.

ALPHONSE GOULLIoud, OF BARCELONA, SPAIN.

Letters Patent No. 101,006, dated March 22, 1870.

## IMPROVEMENT IN LOOM FOR WEAVING IRREGULAR FABRICS.

The Schedule referred to in these Letters Patent and making part of the same

To all whom it may concern:

Be it known that I, ALPHONSE GOULLIoud, of Barcelona, in the Kingdom of Spain, have invented new and useful Improvements in Sectional Let-Off and Take-Up Mechanism; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings forming part of this specification.

My invention relates to looms for making unevenly-woven articles, and consists in certain improvements, which will be specified hereinafter.

The same letters in all the figures represent the same parts.

One of the objects which I have in view is to produce an improved take-up mechanism, and to overcome the difficulty heretofore experienced in the proper pulling of the fabric. The warp-threads, through which the weft has not passed, do not require to be pulled, but to be left so that after forming a gusset, the weft may pass in a direct line through the whole breadth of the warp.

This object I have accomplished by the following mechanical instrumentalities:

A B are a series of keys, formed of any suitable material, and constructed as shown in fig. 4 of drawing, with a large rectangular slot to inclose cam-shaft F, and a smaller one for the shaft C.

The projections *a b* are shaped as seen in the drawing, and provided with vertical pins *c* on one end thereof.

The plates B have also curved projections, *p*, against which the cam O operates, and oblong slots, to allow them to slide on the shaft C.

The shaft F has two sets of cams, *i j*, arranged on opposite sides, each of which occupies somewhat less than a semicircumference. There are also two longitudinal ungrooved portions of the shaft on opposite sides, and between every two cams there is a suitable recess. Thus the shaft F has cams and recesses alternated, in the respective sets *i* and *j*, so that a cam on one side is opposed to a recess on the other.

On one of the corners of each of the plates B is located a hook, *k*, to which is attached a weighted cord, *l*, that passes over a pulley, *m*.

Shaft G, as shown in Figure 11 of the drawing, is provided with a series of cams, O, equal in number to plates B, and are rotated in contact with the curved projections *p*, and these cams hold the keys B forward until about four weft-threads are laid in the warp, when the recesses of the cams allow the keys to be moved back by the weights attached to them, and then they are by the cams again moved forward.

H, Figure 3, is a rotating shaft provided with cams, to depress the respective keys.

The mode of operation is as follows:

During the rotation of the shaft F, the cams *i* will raise one set of plates, A, while the other rests in the recesses, then the straight longitudinal portion will cause all to be raised, and then the cams *j* will retain the other set, B, and the plates A will be allowed to descend.

Each set of the warp-threads proceeds from a beam in the back part of the loom, and is independent of the others in its motions, while it is also provided with a weight, which acts counter to that upon a corresponding key, B.

At the first movement, the keys A will oscillate on the stationary shaft C, rise and puncture the cloth from beneath, at one or two-twentieths of an inch from the race of the reed. At the next movement, they will be lowered, and keys B will rise and puncture the cloth. At this time two weft-threads are passed. At the third motion, the keys A rise again, and puncture the cloth at the same place, when a third weft is passed. At the fourth movement, the keys B again seize the cloth, while a fourth weft is passed. The alternate relieving and holding of the fabric being woven has allowed the fabric to accumulate in a sort of fold on the pins, and after the fourth passage of the weft the portion of the cams O allows the weight to act on the keys and draw the fold or slack fabric taut.

When weaving on one side of the cloth, the same effect is produced only in that portion where the weft passes, because it is in this portion alone that a fold can be formed.

In weaving throughout the whole breadth of the warp, all the keys B are moved in the same way, and the cloth is pulled throughout its whole breadth. It will thus be perceived that the cloth, as it is woven, is pulled by means of movable keys actuated as specified, (or in any other suitable manner,) but not by the Jacquard, as has been done heretofore.

It will also be observed that the carrier depends for the scope of its action upon the breadth of the fabric.

I govern the action of the weights with reference to the keys as follows:

I is a lever provided with a pawl, J, gearing with a ratchet-wheel, K, as shown in Figure 2 of drawing. This lever receives its to-and-fro motion from the connecting-rod and crank that operates the lay.

M is a toothed wheel in connection with the ratchet-wheel K, and turning on one of the cheeks D, a rotary motion is thus given to a cog-wheel, N, on the end of shaft F.

This wheel N also gears with a return pinion, O,



which, meshing into the cog-wheel P on an end of the cam-shaft G, imparts to the latter a rotary motion.

To the other end of shaft G another cog-wheel, Q, is keyed, Figure 3, imparting the rotary motion to a cog-wheel, R, on one end of the cam-shaft H.

As it occurs sometimes that the equilibrium of the weight is not broken by the lay stroke, and that then the cloth is not pulled regularly, I add to the balance-weights *n* attached to the keys B, a lever, which lifts this weight so as to neutralize its traction completely when no pulling is required, and drops it at the proper time for its action.

In fig. 2 of drawing, there is at 1, on each cord *l* attaching the weights of keys B, a lever, 1-2, oscillating at 3.

A cord, 4, is also attached at 5 to the lever, and at 6 to a beam, 6-7, oscillating at the lower part of the loom.

The end 7 of this beam is connected to one of the needles on the Jacquard machine by a cord, 8.

A hooked elbow-lever, 10-11, is pivoted loosely on a stationary shaft, 12. The branch 10, on the hook proper, engages the end 2 of the lever 1-2 when depressed, the other branch, 11, acting as a weight to hold the hook 10 forward in contact with the lever.

Behind the hook 10 is attached the end of a cord, 13, which, passing under a rod or pulley, 14, rises up to a needle on the Jacquard.

The Jacquard, in pulling the cord 8, causes the beam 6-7 to oscillate, which causes the end 2 of the lever 1-2 to be depressed, and the end 1 to rise. This lifts the balance-weight *n*, and consequently prevents its action, while the end 2, being lowered, is caught by the stop-hook 10. When, on the contrary, the work requires to be pulled by the action of the weight *n*, the Jacquard pulls the cord 13, which, causing the hook 10 to move back, liberates the lever 1-2. This allows the balance-weight *n* to go down and act on the keys, which are left by the cams O in position to be pulled back.

It will be obvious that the above arrangement of levers is not intended to operate the pull of the fabric, but is used merely to facilitate the play of the keys, and may, if desired, be dispensed with entirely.

For a let-off mechanism, I employ a set of beams, arranged at the back part of a loom, and provided respectively with a series of warp-threads, extending to the fore part of the loom, and crossing uniformly the reed, so as to form the warp. Each set of these warp-threads is thus made independent, and their tension constantly the same, notwithstanding that the circumference of the bobbins is lessened by the winding off of the threads.

Figure 13 shows a front view of one element (beam and appendage) of my let-off mechanism.

Figure 14 shows an edge view of the same.

This beam is formed of a cylindrical core and two circular cheeks, one of which is provided with a number of projecting teeth, *o'*.

*p'* is the axis upon which turns the beam *n'*.

*q'* is a piece, formed of two flat rods, sufficiently apart from one another to allow of the teeth *o'* passing between.

*r'* is a small pulley, free to turn inside, and at the upper part of the piece *q'*.

*s'* is a little cross-pin on the inside of the piece *q'*.

*t'* is a balance-weight suspended from the lower part of the piece *q'*.

The thread starting from the beam *n'* passes first over roller or rod *u'*, then down and into the groove

of the pulley, to hold suspended the piece *q'*, then rises anew and passes over a pulley or rod, *v'*, and thence to the reed.

The weighted piece *q'* is attached to the thread, and the piece *s'* rests upon of the teeth *o'*.

The thread being pulled in the direction of the arrow 5, elevates the weighted piece *q'*, and when the pin *s'* rises far enough, the pin *o* escapes from the bobbin, turns less of thread, and the weight descends and catches the next pin *o*, thus allowing the bobbin to turn freely at such times as is necessary to deliver warps.

The second object which I have in view is to produce an improved shuttle-attachment, which will automatically take up the slack produced in the thread by the movement of the shuttle.

In figures 15, 16, and 17 of the drawing, the body of a shuttle is represented by *a'*, the cop having the weft-thread thereon by *b'*, and the friction-rollers by *c' c'*.

Above the forward roller, and in contact therewith, I locate a roll or spool, *d'*, which has an annular recess, *e'* upon its periphery, an internal groove, *f'*, and an aperture, *g'*, which connects the two.

The thread, starting from the cop *b'*, passes around the guide-hook *h'*, through the eyelet *i*, thence to and through the eyelet *j*, whose perforation is in the axial line of spool *d'*, thence diagonally across the annular groove *f'* and through the hole *g'* upon the recess *e'*, thence back to and through an eyelet, *k'*, and finally to the warp.

As the shuttle moves forward in the direction of arrow 1, the rotation of the friction roller *c'* upon its axis and in slight contact with the roller *d'*, will impart to the latter a movement in a reverse direction to its own, and cause it to take up the slack of the thread as fast as made. But when the shuttle has reached the first-depressed warp, its thread lapping around it, is retained and the tension overcoming the action of the roller *c'*, reverses the motion thereof, and causes it to deliver its thread, and if more weft is required, the shuttle in its further movement will draw it from the cop until the shuttle has attained the end of its race. Having reached the limit of its throw and started back on its path, it will again give out slack, which will again be taken up by the spool rotated in an opposite direction from the friction-roller, and so on, as before.

Having thus described all that is necessary to an understanding of my invention,

What I desire to protect by Letters Patent is—

1. The combination of a series of keys, A B, constructed, arranged, and operated as and for the purpose specified.
2. The combination and arrangement in the shuttle-body *a'* of the roll *d'*, operated as and for the purpose specified.
3. The construction of the vibrating lever 1-2, cord 4, beam 6-7, cord 8, crooked and weighted lever 10-11, and cord 13, all arranged as described, so that the Jacquard may raise and lower the weights at the times and in the manner specified.
4. The combination of carrying-keys and sectional let-off mechanism, arranged and operated respectively as and for the purpose set forth.

A. GOULLIoud.

Witnesses:

CHATASSIEZ,  
GUITARD, G<sup>te</sup>VE.