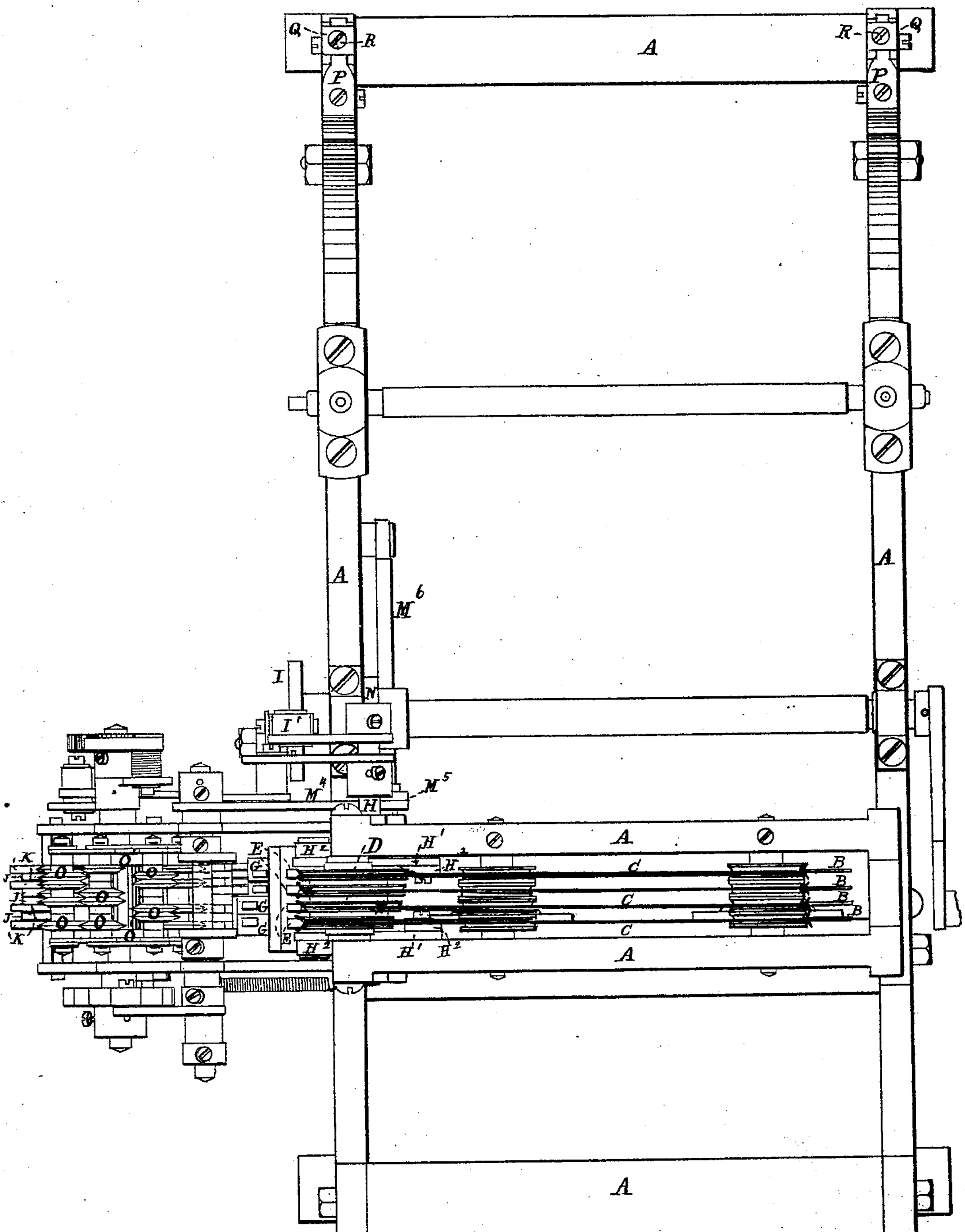
4 Sheets--Sheet 1.

H. D. DAVIS.
Looms.

No. 151,961. Patented June 16, 1874.



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C. F. Southac

FIG. 1.

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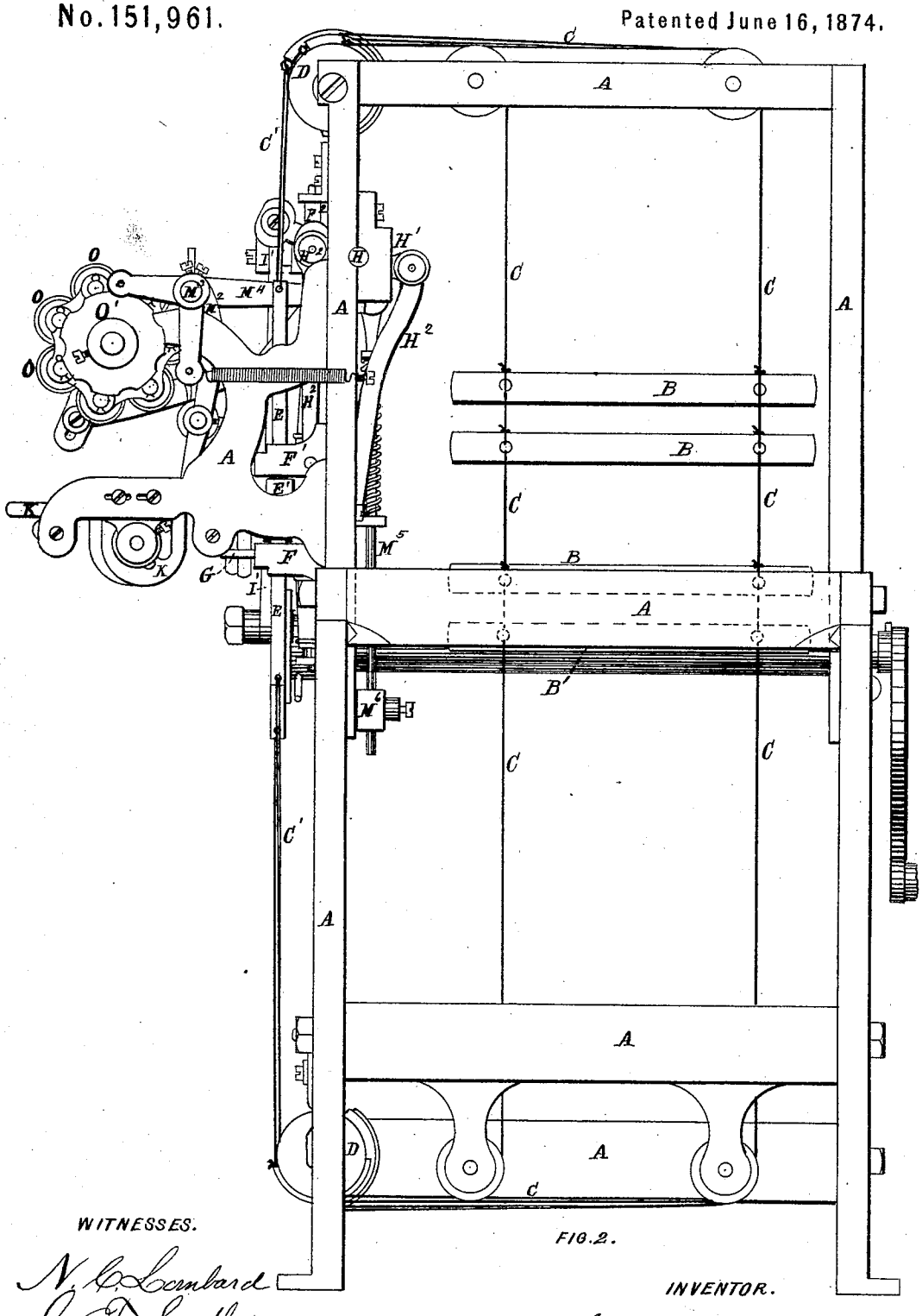

FIG. 2.

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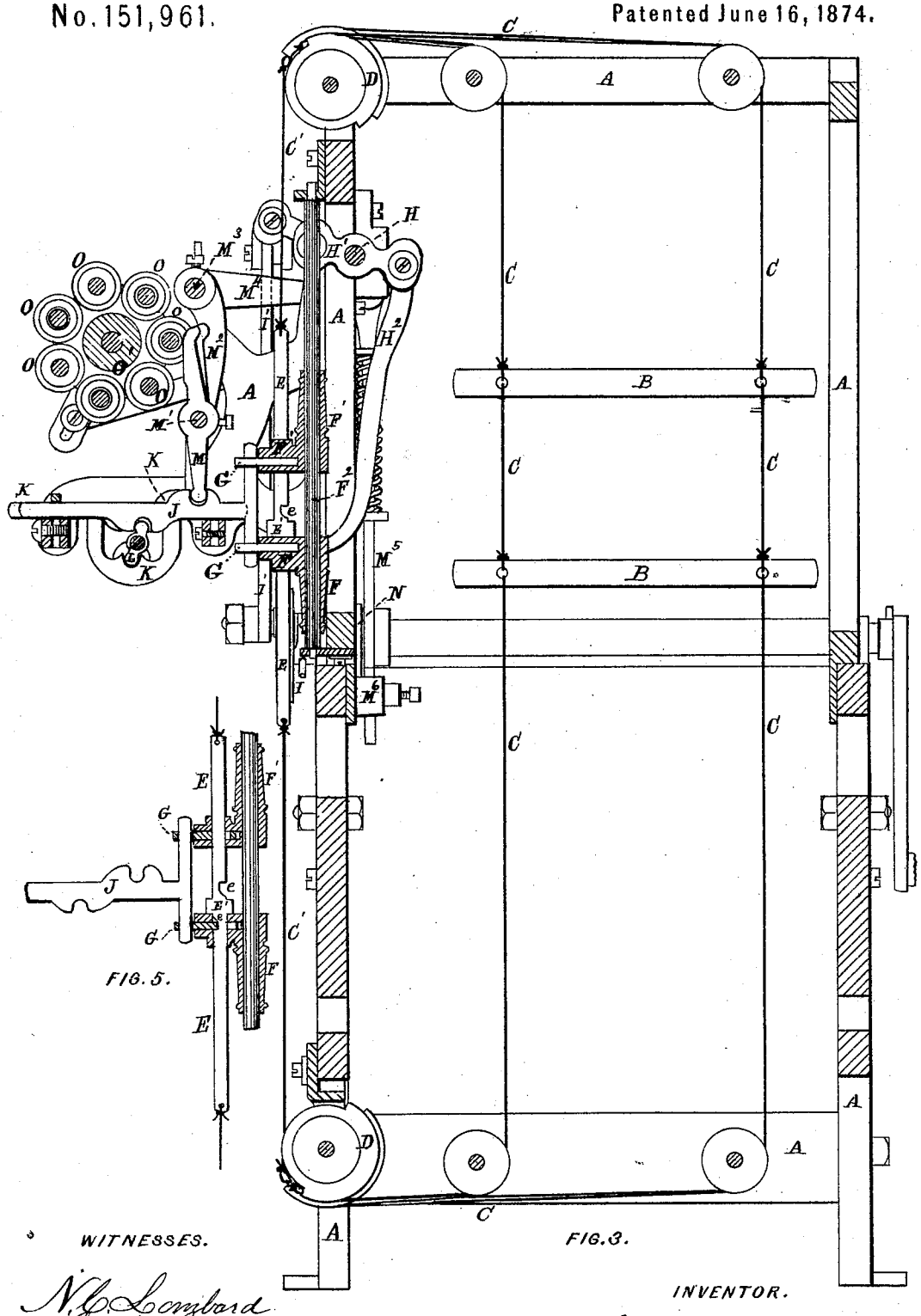

FIG. 3.

FIG. 5.

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FIG. 7.

FIG. 6.

FIG. 8.

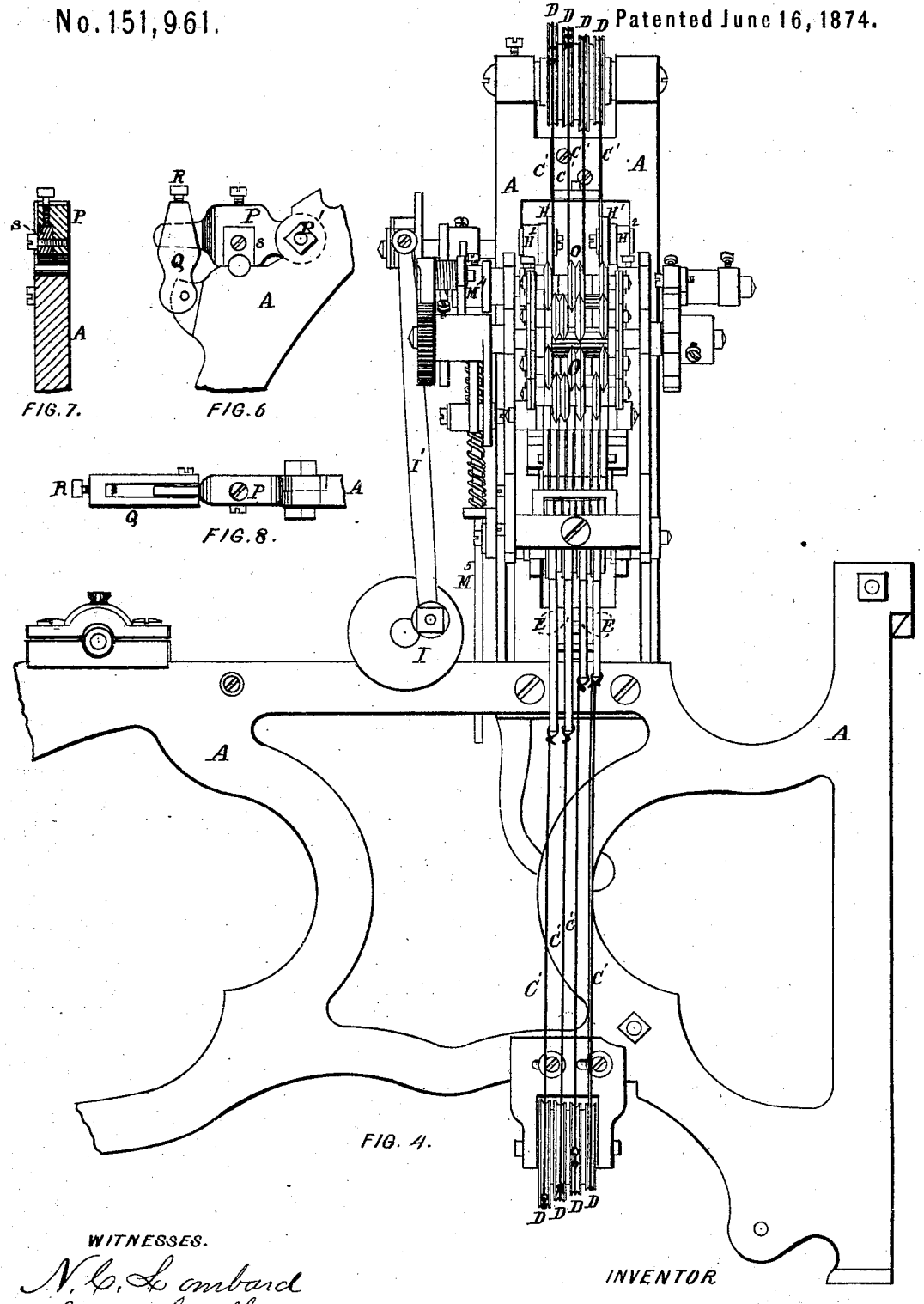

FIG. 4.

WITNESSES.

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C. F. Southae

INVENTOR

Hiles D. Davis

UNITED STATES PATENT OFFICE.

HILAS D. DAVIS, OF NORTH ANDOVER, MASSACHUSETTS, ASSIGNOR TO GEORGE L. DAVIS, JOHN A. WILEY, JOSEPH M. STONE, GEORGE G. DAVIS, JOSEPH H. STONE, AND JAMES H. DAVIS, OF SAME PLACE.

IMPROVEMENT IN LOOMS.

Specification forming part of Letters Patent No. **151,961**, dated June 16, 1874; application filed August 16, 1873.

To all whom it may concern:

Be it known that I, HILAS D. DAVIS, of North Andover, in the county of Essex and State of Massachusetts, have invented certain Improvements in Looms, of which the following is a specification:

My invention relates mainly to modifications in the construction of the mechanism for operating the heddles in a fancy-loom, so called, and for this reason it is thought preferable to describe the mechanism and therein point out the features of invention that are believed to be new without making a preliminary statement of the same.

In the drawings only so much of the loom is represented as serves to show the application of my several improvements to it.

Figure 1 is a plan. Fig. 2 is a side elevation parallel to the heddles. Fig. 3 is a sectional elevation parallel to Fig. 2. Fig. 4 is an elevation at a right angle to Fig. 2; and Figs. 5, 6, 7, and 8 are detached views of some of the parts which will be referred to in the description.

A is the frame of the loom; B B, the leaves of heddles; C C, &c., the cords upon which they are mounted, which are led over pulleys above and below in the usual way, and are attached to the sheaves D D, &c., as shown. E E, &c., are the jacks, to the upper and lower ends of which the cords C′ C′ are attached, and are also attached to the sheaves D D, &c. The sheaves D are made with two arcs or semi-circumferences having different diameters. The several cords C′ C′, which are attached to the jacks E, are attached to the smaller diameters of the sheaves, which are all of the same size, but the larger diameters of the same vary in size, being graduated to give an amount of movement to the heddle corresponding to its position in the shed, so that it shall be operated evenly in a manner well understood. The sheaves D are made in this manner, so as not to occupy a greater thickness than that of a leaf of the heddles; but they might be made in the form of bent levers with the two arms of each of a length equal to the radiuses of the two diameters of the sheaves, to which the several cords could be attached in the same way and produce the same graduated movement of the heddles. F F^1 are the lifter and depresser, which slide up and down upon the guide-rods F^2 simultaneously in opposite directions by means of the rocking shaft H, to the two arms H^1 of which they are connected by the connecting-rods H^2. The rocking shaft H receives its motion from the crank I upon the lay-shaft and connecting-rod I′, or in any other suitable manner. The several jacks E are made of small bars of iron with an enlarged part, E′, in the middle, which forms a shoulder above and below it, against which the lifter and depresser act as eveners to bring the jacks to a central position when the lifter and depresser approach each other. Each jack is also provided with two notches, *e e*, upon opposite sides near the shoulders, as shown, by which the jack is connected with the lifter or depresser by the latches G G, which work in the lifter and depresser, and embrace the jacks, as is shown in Fig. 5. The jacks E work through vertical mortises in the lifter and depresser, as shown, which thus form guides for the jacks and keep them in their proper positions. They also work through mortises in the latches, which mortises are somewhat longer than the width of the jack, so that the latch when moved in one direction will leave the notch *e* free, and when moved in the other direction will engage with it. Both of the latches are made to slide loosely upon the vertical arms of the bars J, by which the latches are moved in and out, and as the notches *e* in the jacks are upon opposite edges of the same, it follows that when one of the latches is engaged with its jack, the other is disengaged, as is usual in fancy-looms working with a "closed shed," so called, in which all the leaves of heddles are either moved up or down at every pick. The bars or guides J slide horizontally in suitable bearings in the framing, and in connection with each one of them, and by its side, is another slide, K, a part of which extends a considerable distance below the other, and works in connection with the short balance-lever L, the ends of which work in suitable notches or gabs in the slides J and K, as is shown in

Fig. 3, which causes them to move simultaneously in opposite directions. Each of the slides J and K also has upon its upper side a gab or notch in which the pattern-levers M work, which are mounted upon the vibrating fulcrum M^1, and against the upper ends of which the rollers O of the pattern-chain work, as is shown in Fig. 3, and thus push in or draw outward the latches G G both by a positive motion under control of the pattern-chain.

The pattern-chain O and its mountings are made and operated in the usual way, as is shown, excepting that each of the rollers or bolls O, is made with two sizes or diameters, corresponding to its two pattern-levers M, and that the circumference of the large part is rounded or sharpened to an edge to receive the edge of the pattern-lever, the surface of which is hollowed to fit it. The purpose of this is to prevent the pattern-lever from getting off from its bolls laterally, and interfering with the next one, for the reason that as there are twice as many pattern-levers as are usual in the same space, there being two for each leaf of heddles and jack, they are made thinner than usual, and placed closer together. The bolls O, of the pattern-chain, are all made alike, with a large and small diameter, as shown, so that in making up the chain it is only necessary to put the large diameter either to the right or left, according to the direction that the heddle is required to be sprung. The circumferences of the bolls may obviously be hollowed, and the faces of the pattern-levers made to match them, and produce the same result as the construction shown. The chain-wheel O′ is turned by a ratchet and pawl, and held by a detent in any of the usual ways, one mode being shown in the drawing, when the movement is derived from the rocking-shaft H by the system of rods and levers represented; but other devices might obviously be used instead. The axis of the pattern-levers M is made to vibrate at the proper time a short distance toward and from the pattern-chain to operate the latches G, while the pattern-chain is at rest, by a mode of operation which has been already set forth and claimed in Letters Patent which have been already granted to me. In this case the fulcrum M^1 is mounted upon the ends of two rocker-arms, M^2, attached to the rocking-shaft M^3, which, through the arm M^4, rod M^5, and lever M^6, receives a proper reciprocating motion from the arm N, which revolves once at every pick.

Figs. 6, 7, and 8 represent my improved mode of constructing the bearings for the yarn-beam.

A represents a part of the frame. P is the cap over the journal of the yarn-beam, which is hinged to the frame at P′, so as to swing up. The outer end of the cap is held down by the swinging stirrup Q, which is also jointed to the frame, as shown, and is provided with a set-screw, R, by which the cap P is held firmly to its seat. The cap is also provided with a movable box, S, which, by the screws shown, can be set up as the bearing wears, so that the yarn-beam can, at all times, be held rigidly and firm, and, by loosening the set-screw R only, the bearings can be opened, and the yarn-beam removed and replaced with great convenience.

The several improvements may obviously be modified in form to adapt them to the various constructions of looms to which they might be applied, and still operate upon the same principle; but the structure shown and described clearly sets forth their nature and mode of operation.

As regards the principle of working the heddles by means of compound sheaves of graduated diameters, that is not broadly new, as the principle is set forth and claimed in the Letters Patent, granted to me, No. 110,904, but in a different form. In that case both sizes of the circumferences of the sheaves were not in the same plane, but side by side, and, therefore, required a much greater space for each sheave, so that the sheaves had to be arranged in two rows to get them into the same space occupied by the heddles—a difficulty which this mode of arrangement avoids.

I claim—

1. The graduated duplex sheaves D, each having its two circumferences in the same plane, in combination with the cords, leaves of heddles, and jacks, when arranged to operate substantially as described.

2. The latches G G, in combination with the lifter, and depresser, and jack, constructed and operating substantially as described.

3. The combination of the latches G G and the devices J K L, or their equivalents, for operating the same simultaneously, with two pattern-levers and a double-pattern mechanism, by which the latches are worked in both directions by a positive motion, substantially as described.

4. The double-faced pattern rollers or bolls, each in combination with two pattern-levers, for operating the latches of the jacks, substantially as described.

5. The pattern-roller, provided with a matched face, in combination with the pattern-lever, having a corresponding face, substantially as described.

6. The swinging cap P, provided with the adjustable box *s*, in combination with the stirrup Q, provided with means for clamping the cap, substantially as described.

Executed at Boston this 11th day of August, 1873.

HILAS D. DAVIS.

Witnesses:
N. C. LOMBARD,
C. F. SOUTHAC.