M. Finkle,

Heddle Machine.

No 7,261. Patented Apr. 9, 1850.

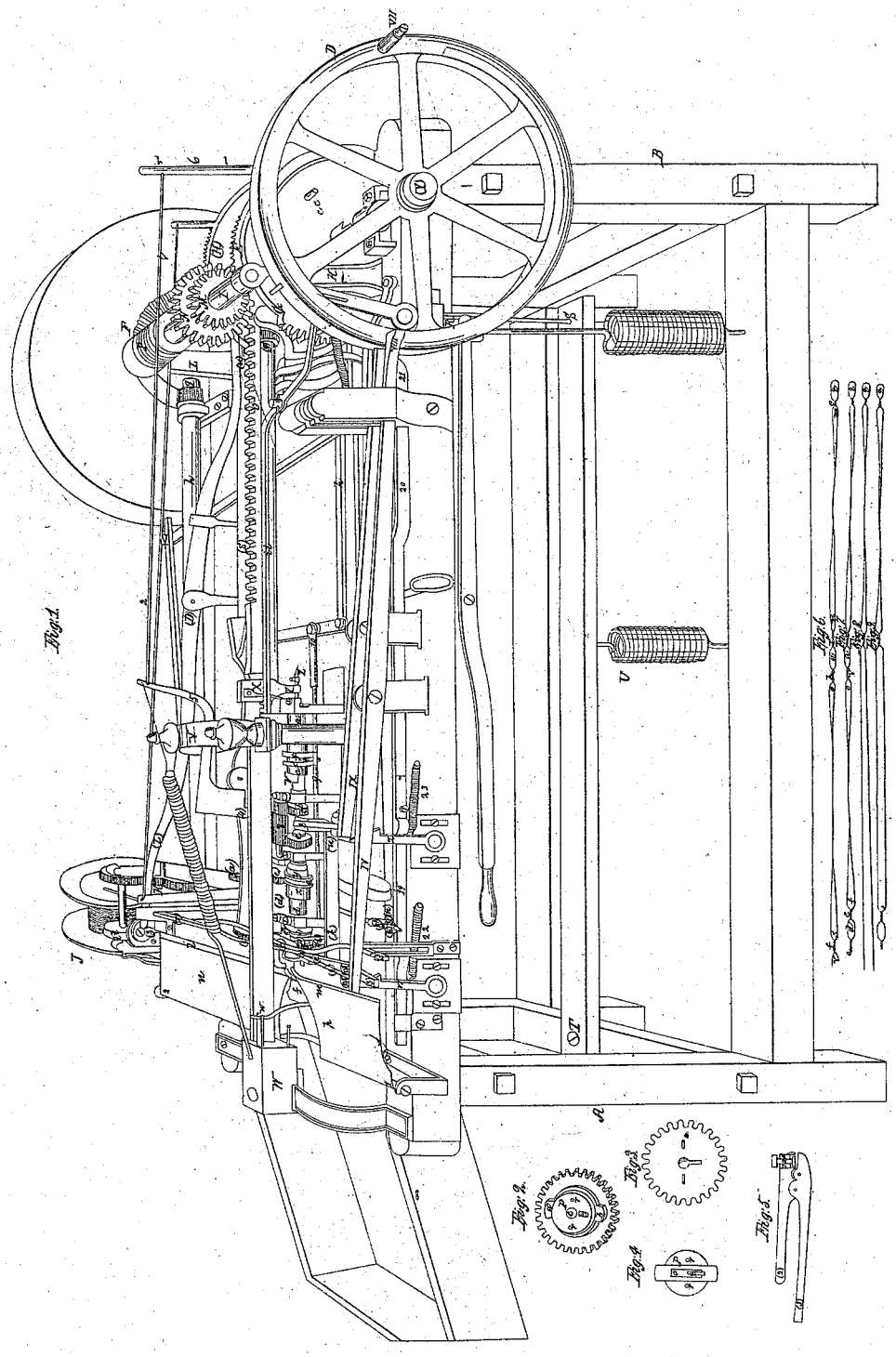

Fig. 1.

Fig. 6.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

UNITED STATES PATENT OFFICE.

MILTON FINKLE, OF UTICA, NEW YORK.

IMPROVEMENT IN MACHINERY FOR MAKING WIRE HEDDLES.

Specification forming part of Letters Patent No. **7,261**, dated April 9, 1850.

To all whom it may concern:

Be it known that I, MILTON FINKLE, of the city of Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in the Machinery used for Making Wire Heddles for Weavers' Harness; and I do hereby declare that the following is a full and exact description of the construction and operation of the same.

The machinery now used for making wire heddles does not form a complete and finished heddle, but leaves part of the work to complete the same still to be done by hand and by the aid of other machinery.

The nature of my invention consists in providing additions to the machinery thus used, by which the heddle is made complete and finished by one operation in one and the same machine.

The drawings hereto annexed, and which make a part of this specification, exhibit the whole machine as improved. This appears in Figure 1. Figs. 2, 3, 4, 5 exhibit some of the additional parts which constitute the improvement. Fig. 6 exhibits the heddle as constructed by the machine now in use; Fig. 7, that as made by the improved machine. Fig. 8 exhibits a selvage-heddle as made by the present machine; Fig. 9, that as made by the improved one, the latter being a complete heddle ready for use, and the former requiring to be completed by hand or otherwise after it comes from the machine.

A B is an oblong frame, on which the machinery is laid. It is about four feet long and about seventeen inches wide, the drawings here being about one-half the actual dimensions of the machine, or six inches to the foot. The moving-power is applied through a belt upon the pulley C. This pulley is on the outer end of a horizontal shaft lying across the back end of the machine and hid in the drawings by the wheels upon it, except the axle Y. This shaft is the prime mover of all the machinery. On the opposite end from the pulley C is the blank-wheel D. On this shaft are also the intermediate wheels, E F, the teeth on each of which are on the side of the rim and not on the periphery; and also the wheel G with a section of spur-teeth on its periphery. The side teeth on the wheels E and F also occupy only a part of the circle, the residue in each wheel being blank and the teeth in the wheel E are divided into two parts or sections, leaving a short blank space between. The first or forward section, being the shortest, is devoted to the insertion of the slack twist in one half of the heddle, as hereinafter described, and the last to the formation of the twists which form the loops or eyes of the heddle. There is also another small wheel on this shaft, (not seen in the drawings,) which, through a cam upon it, moves a horizontal rod on the rear part of the machine, this rod operating shears, which at the point 3 cut off the wire in suitable lengths as it comes from the reel J. These as the machine has been heretofore used are all the wheels which occupy this transverse shaft. The shaft I, parallel to the one just described, and resting in bearings in the tops of the posts K and L, has upon it the small spur-wheels M and N. The teeth on the wheel M are caught by the teeth on the wheel G as the latter is moved in the direction G E. By this means the wheels M N and the pulley P on the shaft I are suddenly turned until the section of teeth G passes the wheel M, when the shaft I and the wheels upon it stand still until the section of teeth G again strike the wheel M. This occurs at each revolution of the wheel G. The teeth on the wheel N work in the teeth on the horizontal ratchet-bar O, which is made to slide easily back and forth in a longitudinal direction, and when the movement just described occurs this ratchet-bar O is suddenly drawn back. This also occurs at each revolution of the wheel G.

Around the pulley P is wound a cord, the lower end of which is seen at R S. At R this cord is attached to the lever S T, which, hanging loosely on the screw T, is held down by the coiled spring U. As the ratchet-bar O is drawn back by the turning of the shaft I, as before described, the cord R S is wound up by the pulley P, and the lever S is raised. This lever, being drawn back by the tension of the coiled spring U, would bring back the wheel N, and with it the ratchet-bar O, as soon as the section of teeth G passes the wheel M, if not otherwise prevented; but, as the bar O is drawn back, the end 4 of the crooked lever 4 5 slides along on the top of this bar, and the lip 4 falls down as the end *w* of this bar passes it and blocks it here and prevents its

return, and here it is stationary while the operation of twisting and cutting off the wire, hereinafter described, are performed. At the instant these operations are performed a pin on the wheel E (not seen in the drawings) strikes the upright lever 6, which, through the wire 2, raises the lip 4 of the lever 4 5, from behind the end of the ratchet-bar *o w*, when the lever S, hanging upon the pulley P, instantly bring back the ratchet-bar *o w* to the position shown in the drawings. All these movements, it is evident, recur at each revolution of the pulley C. This ratchet-bar O, as seen in the drawings, extends along under the arch V to the cutting-block W, against which it is stopped when thrust back by the process just described. About midway in its length this ratchet-bar is clasped by the hasp X, fixed tight to its place. The lower end of this hasp, as seen at Y, takes hold of the wire rod Z. This rod is sustained by proper bearings, and runs horizontally quite through the shafts *a b* and *c d*, which are hollow, the other end of it being seen at *f*. The reciprocating movements (before mentioned) of the ratchet bar *o w*, by means of a hasp, X Y, carry with this bar the rod Z *f*. This movement draws in the wire in suitable lengths as it is unwound from the reel J, the wire taking the place of the rod Z *f* within the shafts *a b* and *c d*, where it is held, the movement being suspended, as before described, while the necessary loops and twists are given to the heddle, and it is then thrust out by the return movement of the ratchet bar *o w*, as before described, the heddle falling into the pan S in front of the machine.

A more particular description of the agencies employed in this process is as follows: The wheel F, on the prime moving-shaft first described, has on the side of its rim the section of teeth seen at F. These in the circuit of the wheel strike the small pinion *g* on the shaft *h*, turning the latter a distance corresponding to the section of teeth at F during each revolution of the wheel F. This movement of the shaft *h* by means of gearing seen at *k* turns a pair of feeding-rollers, one of which is seen at *t t*, drawing from the reel J a length of wire sufficient for a heddle at each revolution of the wheel F. This wire, passing between the blades of shears at the point 3, is brought transversely along in front of the machine, within the coils *l* and *m* on the sheet-iron plates *n* and *p*. These coils *l* and *m* are the edges of the plates *n* and *p* merely turned over in a hooking manner, so as to form a channel for the passage of the wire, in which it may be carried downward with the plates by a slight depression of that side of the plates *n* and *p*, these plates being hinged at the corners 1 and 2. The wire, being drawn along in the channel *l m* to the exact length required for a heddle, is cut off at the point 3, its center being presented immediately over the point *r* of the rod Z *r f*. About half an inch from the end *f* of this rod is a notch or catch, (seen at *r*.) At the instant when the wire is cut off, as before mentioned, the side *l m* of the plates *n p* is slightly let down, carrying the wire down in the channel *l m*, the center in the piece of wire falling directly before the catch *r* in the rod Z *r f*. At this instant the movement heretofore described in the ratchet-bar *o w* takes place, suddenly drawing back the rod Z *r f*. The catch *r* on the rod, seizing the wire in its center, carries it double quite through the hollow shafts *d c' b a*. From *d* to *a* is not one continuous shaft. From *a* to *b* is one shaft, and from *c* to *d* another, the wheels at *b* and *c* being on the ends of these shafts respectively, the pinchers *t* occupying the space between. The jaws of these pinchers are extended as the wire is drawn in, and when the wire arrives at the proper place the pinchers are closed, seizing the two strands of the wire. The place in the wire held by these pinchers corresponds to *a* in the drawing of the heddle, Fig. 6. The holding of the wire by the pinchers here prevents its twisting at this point, and the twisting on each side of *a* by the turning of the shafts *a b* and *c d*, Fig. 1, forms the loop *a*, Fig. 6. The loop *t* is formed as the wire is drawn into the machine, lapping around the oblong square *f r* on the end of the rod *f r*, this oblong square operating as the wedge to keep the wires apart at this place while the twist *e*, Fig. 6, is given. At the points *m n o s* the wires are kept apart, so as to concentrate the twist of the wire at *e r h f*, by wedges thrust between the wires here on the instant before the twists are given, these wedges turning with the wires in the revolutions which make the twists. One of these wedges is seen at V, Fig. 1, the upper side being denoted by the diagonal line under the letter. It is thrust down between the wires, as above mentioned, by the collar *a f f*. This collar, and a similar one on the adjoining shaft at *x y*, are moved by the forks *e* and *e*, attached to the horizontal rod 9 10, these forks passing between the guides *f f*, and embracing the collars on both sides, the latter sliding easily on the shafts. These wedges are withdrawn by the collars being withdrawn, and by the force of a pin passing through the collar, as at *a*, in the collar *a f f*, the pin passing under the handle or neck of the wedge, the latter being fastened to the shaft and lying on this pin. *x y* is the other collar, performing a similar office to that at *a f f*, the wedge not being here seen. The rod 9 10, as is seen in the drawings, is the agent which moves these collars, the impulse being received from a pin, *c c*, on the side of the rim of the wheel G, this pin striking a cam on the end of the bar *h* and pressing this bar, and through it the rod 9 10, slightly forward. When the twists are given to the heddle and these wedges are withdrawn, as herein mentioned, the return movement of the ratchet-bar *o w* carries out the heddle, and it falls into the pan S, as before mentioned.

2 is the upper, and 3, Fig. 1, the lower, part of pinchers, so located that when closed the jaws take hold of the wire ends, as at V,

Fig. 6. These pinchers seize the wire immediately after it is drawn in by the rod *f Z*, Fig. 1, and they hold fast till the necessary twists are given to the wire to form the heddle, as shown in Fig. 6. The outer end of the part 2 of these pinchers work on a pin which passes the stands *o o* on each side of it, and the pinchers are worked by the lever IV pressing down the part 3, which is caught by the catch VI. The like is the case with the pinchers *t*. The under part, being pressed down by the lever IX, is caught by the catch X. These pinchers are held by the respective catches VI and X while the necessary twists are given to the heddle. They are then disengaged by the bar 19 20, this bar being thrust forward by a pin on the periphery of the blank-wheel D, this pin striking the oblique end 21 of this bar, setting it slightly forward, disengaging the catches VI and X, when the bar resumes its place again through the tension of the wire springs 22 and 23. The lever IV is worked by the pin VII on the blank-wheel D, this pin striking the end VIII of the lever IV at each revolution. In like manner the pinchers *t* are worked by the lever IX, the latter receiving its impulse from another pin on the blank-wheel D.

It will be seen on reference to Fig. 6 that there is a slack twist in the wire strands between *m* and *n* and between *o* and *s*. These are intended to stiffen the wire and keep the strands together. This slack twist between *o* and *s* is caused by one of the sections of teeth on the wheel E striking the pinion *g* on the shaft *i i*, the smallest of these sections of teeth striking the pinion *g* first. By this means the shaft *c d* makes one revolution, inserting the slack twist, seen from O to S, Fig. 6. At this instant a sliding wedge, working on the flange or collar 4, Fig. 1, occupies the space S, Fig. 6, between the wires, preventing the turning of the wires beyond this point. The slack twist from *m* to *n*, Fig. 6, is inserted at the same time of that from *o* to *s*, but not by the same agency. It is effected by pins on the wheels G and E striking a pair of treadles, from which a cord is hung upon a pulley above, giving this pulley for this purpose one revolution, and through it one revolution is also given to the hook-rod *Z f*, which holds the wire, as before described. These treadles and pulley are not seen in the drawings. The wedges in the shafts *a b* and *c d* are then inserted during the passage of the space between the sections of teeth on the wheel E, and then the passage of the larger section of teeth adds the closer twist on each side of the several loops of the heddle.

The parts of the machine thus described are those which constitute the machine as heretofore used, and the heddle produced by it, as before stated, is that shown in Fig. 6, leaving the loop at *s* only partially formed, having a twist on one side only, and leaving the burr V without being cut off, thus rendering it necessary, in order to finish the heddle, that, by hand and with the aid of other machinery, the burr V should be cut off, and a perfect loop formed at *s*, by giving it a proper shape and a twist on both sides. The heddle would then be finished and ready for use, as shown in Fig. 7. It is to do this work at one and the same operation with that above described, and by the same machine, that the improvements mentioned are designed. These improvements consist of the additional parts of this machine, which are shown in the drawings, and which I will now proceed to describe.

No other prime mover is added to the machine, but the impulse which propels the additional machinery is received from the transverse shaft already described, on which are the pulley C and the wheels D E F, Fig. 1. On this shaft is placed, for the purpose, the additional wheel H. On this wheel also are two sections of side teeth, one of which is faintly seen at H, being on the opposite side of the wheel from the view. These teeth strike the pinion *u* on the horizontal shaft *s*. On the opposite end of this shaft is the pinion *a*, which carries the wheel *c* on the short shaft *d*. On the opposite end of this short shaft is the layer-wheel *h o*, which matches with and turns the wheel *p*. This brings the motion to the place of the heddle where it is formed. The rod *f r Z*, which passes through the hollow shafts *a b* and *c d*, as before described, also passes the center of the wheel *p*. This wheel, when the wire for the formation of the heddle is drawn in, as before described, encircles the two strands of the wire at the exact point where the loop *d*, Fig. 7, is to be formed. There is fixed upon the side of this wheel the slide-bar *a b*, Fig. 2, which, being pressed back and forth alternately, and at the proper juncture in the movement of the other machinery, carries with it a wedge, which passes between the strands of the wire and remains there while the twists on each side of it are given to form the loop *d*, Fig. 7. Fig. 2 represents this wheel with the slide-bar *a b* fitted to it. C is the hole in its center, through which the wire passes, and *t c* the wedge fixed to the slide-bar, and which moves with it, and at the proper time is thrust between the strands of the wire, and again at the proper time is withdrawn to allow the heddle to pass out. The cavity *c* passes through the slide-bar *a b* and the collar *p*, as well as through the wheel. In the slide-bar this cavity is an oblong slot, as seen at O, Fig. 4, where the collar is taken off, exhibiting its under side and showing more plainly the wedge *t*. The collar *p*, Figs. 2 and 4, are identical, Fig. 4 showing its under side. It is fastened to the wheel by screws at *r r*, Fig. 2, and its circumference forms a bearing or gudgeon for the wheel, a similar bearing being turned up on the opposite side. These bearings rest on supporting-stands fixed on either side, and so placed that the center *c*, Fig. 2, of the wheel is directly opposite the center of the shaft *d*, Fig. 1, or in line with the position of the

wire rod *f Z*. This wheel, therefore, is moved independent of the shaft or cylinder *d*.

b is the upper end of the slide-bar *a b*, Fig. 2, and this, after the wire is drawn in, as before described, is presented vertically directly under the crooked lever 3 4 0 at the point 4, and the lever IV, at the same time that it closes the pinchers 2 3, as before described, also presses down the lever 3 4, which thrusts the wedge attached to the slide-bar on the side of the wheel P, and more plainly shown at *a b*, Fig. 2, between the two strands of the wire, leaving a space of about three-eighths of an inch between the wedge and the side of the pinchers. The handles 2 3 are seen in the drawings, Fig. 1, the pinchers at the same time seizing the wire, as before described. The movements of these parts of the machine are as follows: The first of the two sections of teeth before mentioned on the wheel H, which strikes the pinion *u*, is the shortest of the two. This section of teeth operating on this pinion and moving the gearing at *a c o* gives to the wheel P a motion only sufficient to bring the slide-bar and wedge connected with it, as before described, to a vertical position. This, from its occupying a horizontal position, requires in the direction of the proper movement only three-fourths of a revolution, leaving this slide-bar, after the passage of the first section of teeth on the wheel H, as aforesaid, in a vertical position, the end *b*, Fig. 2, being upward. Instantly after this is done the slide-bar is thrust down, and with it the wedge *t c*, the latter passing between the two strands of the wire to form the loop *d*, Fig. 7. At the same time the wedges before mentioned for forming the other loops of the heddle are also inserted, as before described. At this juncture, and while the twists are given to the other parts of the heddle by the turning of the shafts *a b* and *c d*, as before described, and by a simultaneous movement, the other and larger section of teeth on the wheel H strikes the pinion *u*, giving to the wheel P four and three-quarters revolutions, forming thereby the necessary twists *c* and *e*, Fig. 7, on each side of the loop *d*, and leaving the slide-bar *a b*, Fig. 2, again in a horizontal position, as at the beginning, this position being necessary in order that the loop here formed should correspond to that at the opposite end of the heddle, both presenting a face transverse to the center loop *a*.

In the twist *e*, Fig. 7, there are double the number of turns in the wire of that in the twist *c*. This is occasioned by the motion of the wheel P, Fig. 1, being in the same direction as that of the adjoining shaft *d*. The former having twice as many revolutions as the latter, but one half of those revolutions on the side C, Fig. 7, (the wheel occupying the space *d*,) are required to neutralize the turns given by the shaft *d*, leaving only one half for positive twist in the wire. This disproportion in the twists *c* and *e* is useful in giving a sufficient number at C, while the increased number at *e* renders the connection at this point stronger and more certain to hold.

Fig. 3 simply represents the wheel, Fig. 2, divested of the collar P, these being made separate and screwed to the wheel.

Thus the twists *c* and *e*, Fig. 7, are formed and the loop *d* is perfected.

The cutting off the burr V, Fig. 6, is still to be performed to complete the heddle. This is done in the following manner: The pinchers 2 3, Fig. 1, heretofore mentioned, are shown separate in Fig. 5. It is upon the side of the upper jaw of these pinchers that the cutter is affixed, which cuts off these wire ends the instant after the necessary twists are given to form the heddle. This cutter is seen at *a*, Fig. 5. It slides up and down loosely between the jaw of the pinchers and the overlapping guards O O. Its edge is presented to the wire downward, and is made to cut off the wire ends close to the jaws of the pinchers immediately after the twists are given. Through the top of this cutter is a small hole, in which the point of an elastic spring is inserted, by which it is readily brought to its place again after the wire ends are cut off.

The handles of the pinchers 2 3, Fig. 5, correspond to 2 3, Fig. 1; but the cutter and jaws of the pinchers are not seen in the latter figure. This cutter is suddenly pressed down for execution by the lever *e r*, which is bolted at one end to the stand O O and at the other end is operated by the crooked lever L D, which latter lever is hung in its center at D and receives its impulse from a pin on the side of the wheel H. Under the lever *e r* is a spring which brings back this lever to its place immediately after it has done its work.

Instead of placing the cutter just described on the side of the pinchers for cutting off the wire ends, a separate shears may be located for this purpose between the pinchers and the wheel P, Fig. 1, which may be operated in a way similar to that above described; but the cutter as above described is more simple and better adapted to the purpose.

When the necessary revolutions are given to the wheel P, Fig. 1, to give the required twists to the heddle, as before described, the end *a* of the slide-bar *a b*, Fig. 2, is left in the position seen at P, Fig. 1, presented laterally opposite the end of the crooked lever *f* W I, at the point I. The crook in this lever is hid in the drawing behind the bar *k u* at the point *k*. This lever thrusts back the slide-bar P, Fig. 1, withdrawing the wedge *t c*, Fig. 2, from between the wires. This lever is operated by the pin, at *b* in the upper side of the bar 19 20. This pin, in the direct movement of the bar 19 20, before described, which disengages the catch VI and X from holding the two sets of pinchers, strikes the cam *n* on the crooked lever *f* W I. This drives the lever *f* W I directly forward, and, striking the slide bar at P, Fig. 1, by the end I of the lever, presses it back to its place.

To form the selvage-heddle by the machine,

improved as herein specified, finishing it ready for use, as shown in Fig. 9, it is simply required to remove the wheel 8, Fig. 1, or raise it out of gearing with the adjacent wheels. This being done, the shaft *d* will remain stationary, and the machine will then complete the selvage-heddle.

I do not claim the old machine herein described, as being one heretofore used, and by which an incomplete heddle is produced; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. The before-described arrangement, combination, and adjustment, with the said old machine, of the additional wheel H on the main transverse shaft Y, Fig. 1, the pinion U, and the shaft S, moved by it, wheel *a* on the other end of the shaft, the short shaft *d*, and the two wheels *c* and *h o* upon it, wheel P and its attachments, and the cutter *a*, attached to the pinchers, as shown in Fig. 5, for trimming off the burr at the end of the heddle, and also the levers D, *f*, W, I, 3, 4, *o*, *e*, and *r*, whereby the heddle is made complete in one machine at one and the same operation, or any other combination which is substantially the same thing and by which analogous results are produced.

2. What is herein termed wheel P, as herein described, and as shown in Figs. 2, 3, and 4.

MILTON FINKLE.

Witnesses:

JOHN F. SEYMOUR,
W. C. JOHNSON.