

R. Reynolds.
Power Loom.

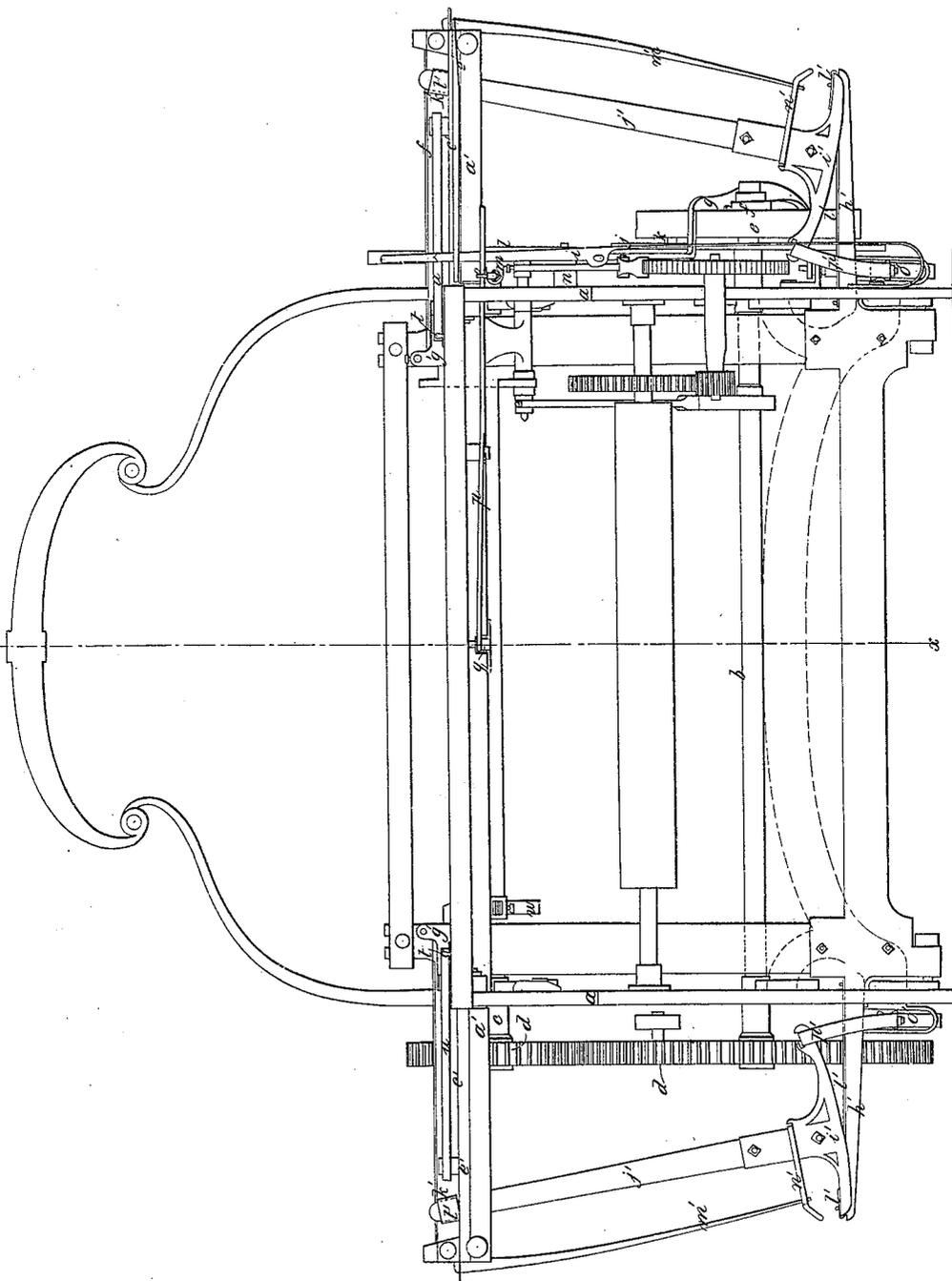
Steel 1-3 Stents.

N^o 8,984.

Patented Jun. 1, 1852.

Fig. 1.

Front Elevation

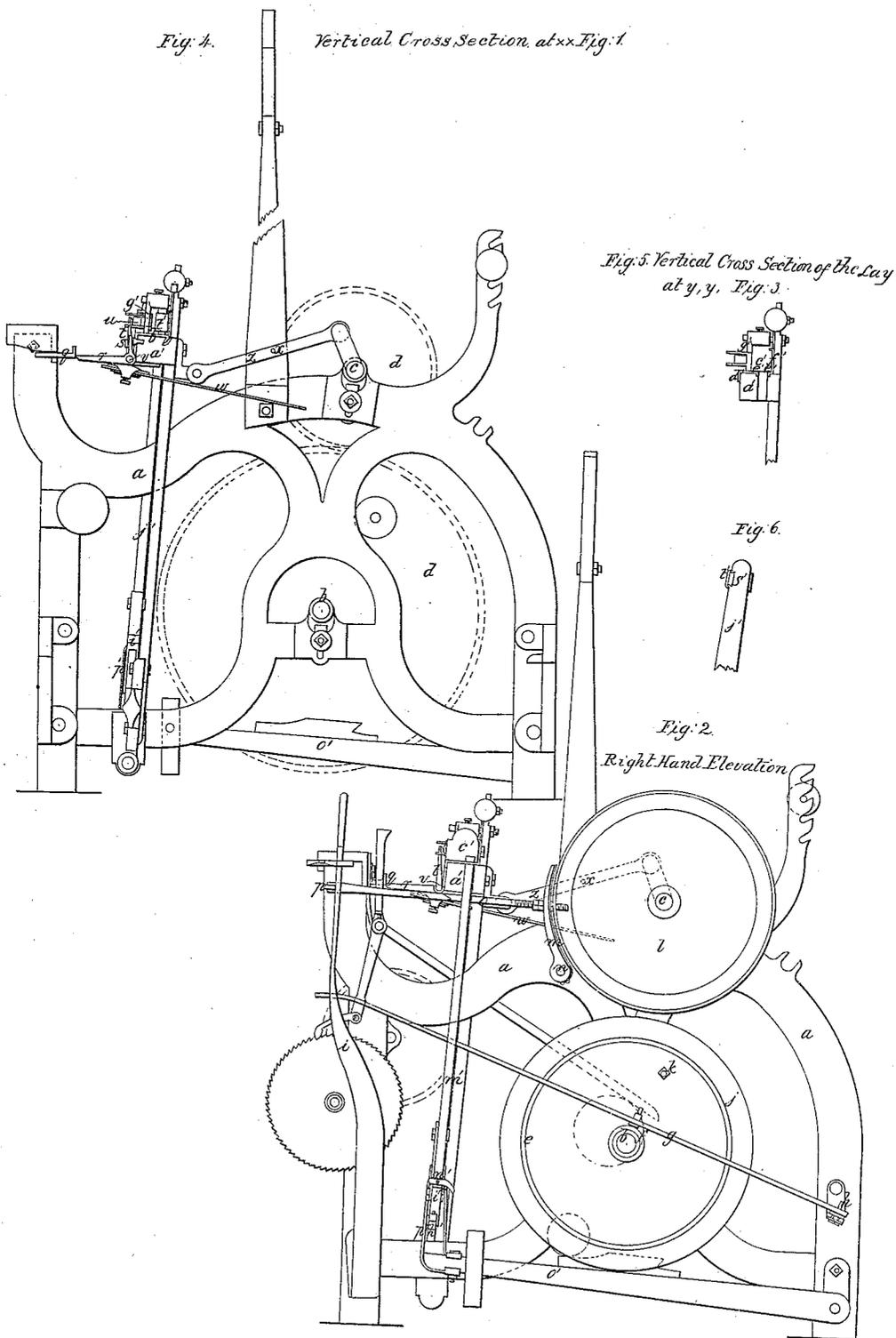


R. Reynolds. Power Loom.

Sheet 2-3 Sheets.

N^o 8,984.

Patented Jan. 1, 1852.



R. Reynolds. Power Loom.

N^o 8,984.

Patented July 1, 1852.

Fig. 7.

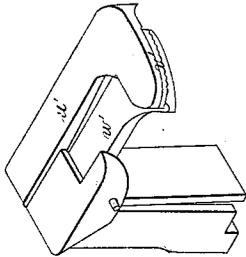


Fig. 8.

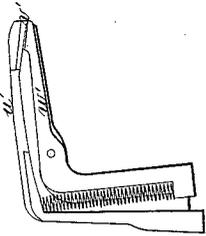
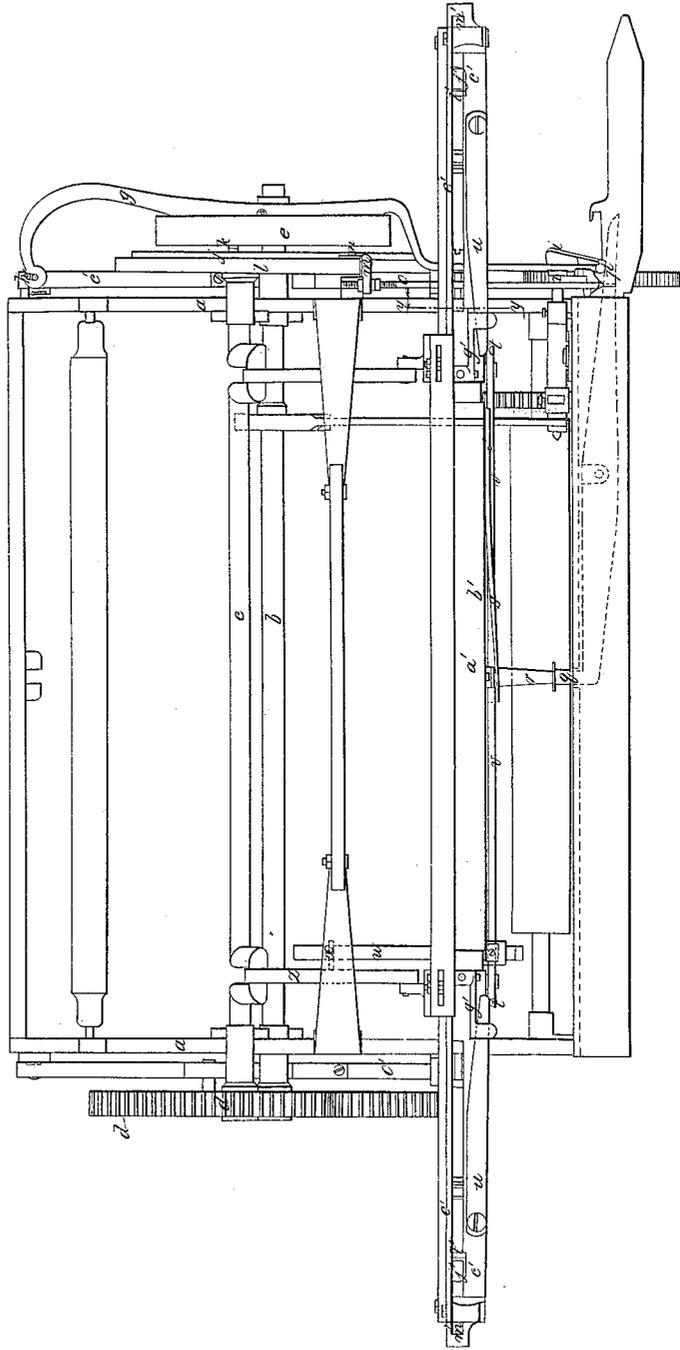


Fig. 3. Plan View.



UNITED STATES PATENT OFFICE.

R. REYNOLDS, OF VALATIA VILLAGE, NEW YORK.

POWER-LOOM.

Specification of Letters Patent No. 8,984, dated June 1, 1852.

To all whom it may concern:

Be it known that I, RENSSELAER REYNOLDS, of Valatia Village, town of Kinderhook, and State of New York, have invented certain new and useful Improvements in Power-Looms, and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1, is a front elevation, Fig. 2, a right hand elevation, Fig. 3, a plan, Fig. 4, a vertical section taken at the line x, x , of Fig. 1, Fig. 5, a section of the lay taken at the line y, y , of Fig. 3, Fig. 6, a section of the picker, Fig. 7, a separate perspective view, full size of the temple and Fig. 8, a longitudinal vertical section thereof.

The same letters indicate like parts in all the figures.

Since the first successful application of the power loom to the art of weaving, nearly all, and by far the most important improvements which have been made in the loom for weaving plain fabrics are to be found in apparently slight modifications of the mechanism with the view to increase the speed without giving such serious shocks, either to the mechanism or the threads to be woven as would break them. Rapidity of weaving, quality of product, cheapness of original construction and durability, are the essential objects to be attained in the great rivalry of weaving. Every modification therefore, that either increases the rapidity of weaving, reduces the original cost, or increases the durability or improves the quality of the fabric produced, becomes of national importance.

To the best of my knowledge the highest practical speed heretofore attained is 140 picks per minute. But by my improvements I have been able to attain with entire success about 200 picks per minute, while at the same time I have reduced the cost of construction without increasing the liability to break.

The first part of my invention relates to the picker staff motion. The upper ends of the picker staffs in my improved loom constitute the pickers for driving the shuttle, and as for this purpose that face of the picker which strikes the shuttle must during its vibration traverse along a line parallel with the surface of the race board, the lower end of the staffs to this end are formed

with rockers the curves of which are segments of circles struck from the points of contact with the point of the shuttle. This has heretofore been done and I do not therefore claim it, as of my invention; but the mode of application heretofore adopted is defective. The rocker was connected with and kept onto its bed on the lay by one or two jointed links or metal straps jointed at one end to the rocker and at the other to the bed, which necessarily caused the rocker at every vibration to slide on its bed. Besides this mode of connection would not admit of the rapid motions which I desire to, and have attained. The nature of this part of my invention consists in connecting the rocker of the picker staff with the bed on which it rocks by means of a strap interposed between the two, and attached at one end to the outer end of the rocker, and at the other to the inner end of the bed, so that the tension of the spring which draws back the picker staff, and the resistance of the shuttle always keep this interposed strap tight, while the rocker is held down to the bed by the tension of the connecting strap and the strap from the treadle by which it is operated. By this means the parts are rendered durable, avoid friction and admit of much greater rapidity of motion than ever before attained.

The second part of my invention, relates to the method of arresting the shuttle when boxing. At the time the shuttle enters the box it should meet with a gradual resistance to arrest its momentum to avoid the shock and its consequences which otherwise would be produced by striking against the picker. This has heretofore been done by means of a spring lever in front of each shuttle box called the binder. It is important that there should be as little resistance as possible to the motion of the shuttle at the time of starting. With the view to effect this last object, looms have heretofore been constructed with a lever projecting from what is called the protector rod which is connected with the shuttle binders, and at the time the shuttle is thrown this lever is struck by a pin on one of the connecting rods by which motion is communicated from the cranks to the lay, thus elevating this lever, so as to remove the pressure of the springs from the binders at the time the shuttle is thrown. This mode however is defective for the reasons that the binders

always present the same resistance to the shuttle, from the time it begins until it has completely entered the shuttle box; and because it will not admit of very rapid motions on account of the shocks produced by the striking of the pin against the lever. These defects I have avoided by leaving the shuttle free from the binders at all times except when entering the box, and gradually increasing the pressure of the binders, as the shuttle moves in the box until it is entirely arrested. And to this end the second part of my invention consists in forcing the binders inward against the shuttle, while entering the box, by means of an arm on a rocker provided with a spring, which is acted upon by a pin on one of the connecting rods extending from one of the cranks to the lay. In this way I avoid the severe shocks, heretofore experienced, the spring gradually yielding to the action of the pin, and the pressure on the binders being gradually increased to gradually arrest the shuttle by the increasing tension given to the spring by the motion of the pin. I have found by repeated experiments, that at the high velocities which I have attained on my improved loom, that metal springs under the rapid vibrations induced by percussion to which they are exposed, break so often, as to render the expense of renewing them together with the loss of time a matter of serious consideration. To remedy this, I instituted a series of experiments and finally discovered that springs made of wood will resist the most rapid vibrations induced by percussion, for a long time without being seriously injured.

The fourth part of my invention relates to the mode of securing the raw hide to the picker staffs. The force and rapidity given to the points of the shuttle by the pickers cause small pieces of the raw hide to break off which frequently lodge on, and are woven into the cloth, thus injuring the surface of the fabric, and, when intended for prints, seriously injuring it by indenting the surface of the rollers; and besides the upper end of the picker staffs being necessarily small it became a serious matter to devise a practical mode of securing the raw hide to the wooden staffs. The nature of this part of my invention consists in letting in and fitting the raw hide to the face of the picker staff and securing it thereby by a leather strap or its equivalent which envelops the two, thus firmly securing the two together and at the same time preventing pieces from breaking and flying off.

In the accompanying drawings *a*, represents the frame of the loom, and *b*, the driving shaft which communicates motion to the crank or lay shaft *c*, by cog wheels *d*, *d*. On the end of the driving shaft there is a loose pulley *e*, which receives the belt

from some first mover. On the hub of this pulley there is a collar *f* (which turns freely between shoulders) provided with a pin that passes through a hole in a lever *g*, that turns on a fulcrum pin *h*, the end of the said lever being passed through a mortise in the spring shipper *i*, so that by the motion of the shipper the loose pulley is made to slide on its shaft.

By the side of the loose pulley there is an arm or wheel *j*, fixed to the shaft, and provided with a clutch spur corresponding with a like spur *k*, on the loose pulley, so that when the pulley is pushed in by the shipper, the pulley and wheel shall be clutched, to communicate motion to the shaft, and when pushed out by liberating the shipper, that the pulley shall run free. The great advantage of this arrangement over the usual mode of driving looms by means of the fast and loose pulley, is that the loose pulley is instantaneously connected or disconnected from the clutch wheel, while in the old mode a considerable length of time is required to complete the connection on account of the width of the belt, thereby also occasioning a loss of power.

On the end of the lay shaft there is a fly-wheel *l*, against the periphery of which a brake *m*, makes friction when the loom is thrown out of gear. This brake is hung on a stud pin *n*, and its upper end is connected by a rod *o*, with a shipping lever *p*, turning on a fulcrum pin under the breast beam, the inner end of the said lever being connected with the protector stop *q*. The race beam of the lay is provided with a protector *r* of the usual construction, but the tension of its spring, *s*, is just sufficient to hold up the protector *r*, but not to force its arms *t*, *t*, so hard against the shuttle binders *u*, *u*, as to bind against the shuttle in the shuttle boxes.

From the foregoing arrangement it will be seen, that during the operation of the loom when the lay beats up, if the shuttle is in either of the boxes, the corresponding binder will be thrown out which so far depresses the protector as to pass under the protector stop *q*; but if the shuttle fails to enter the box as the lay beats up, the protector strikes against and pushes forward the protector stop which liberates the shipper, unclutches the loose pulley, and immediately after forces the brake, *m*, against the periphery of the fly-wheel to stop the loom instantly, which could not be done effectually if the belt itself had to be shifted from the fast to the loose pulley.

To the rod *v*, of the protector, is attached a wooden spring, *w*, which extends far enough back to be struck and forced down by a pin *x* on the connecting rod *z*, which forms the connection between the crank and the lay, so that as this pin continues to de-

scend in its circuit, it increases the tension of the spring *w*, which being on the rod *z*, forces the binders *u*, *u*, as the shuttle is boxing, thus gradually increasing the resistance until the shuttle is brought to a state of rest, and then by the continued motion of the pin, the spring is liberated relieving the shuttle from the pressure of the binders. In this way the binders only act on the shuttle as it is boxing, and this by a gradually increasing force. The spring *w*, I prefer to make of ash wood, as I have found this kind of wood to be best adapted to the purpose.

The race beam *a'*, of the lay is made of wood, and between the shuttle boxes the surface is plated with sheet metal *b'*, turned down at both edges to form flanches, one in front and the other let into the mortise which receives the reed. It is secured to the wood by screws in front, so that the upper surface is smooth to avoid friction as much as possible. The turning of the edges of the sheet metal to form the flanches, gives stiffness, which adds greatly to the strength of the lay with little weight. The shuttle boxes *c'*, *c'*, are made of sheet metal also attached to the ends of the race beam. The front edge *d'* is turned down to make a flanch in front; two other flanches *e'*, *e'*, being bent down to make the slot in which the picker staffs work, and the back edge *f'*, to form the back guide for the shuttle. Thus formed they are secured by screws and bolts to the race beam and to the upper ends of the swords of the lay where they project up above the race beam. The shuttle binders form the front of the boxes, except at the inner ends, which are provided with guide plates *g'*, *g'*, attached by bolts to the upper ends of the swords.

The lay just above the axis of vibration extends out beyond the frame on each side to form two beds *h'*, *h'*, on which play the rockers *j'*, *j'* of the shuttle staffs *j'*, *j'*. The curves of these rockers are segments of circles struck from the points *k'*, *k'*, where the staffs strike the points of the shuttle, so that during the vibrations these points shall traverse along a line parallel with the surface of the race beam. The rockers are formed with flanches on both sides to embrace the bed on which they rock. Between each rocker and its bed there is interposed a leather strap *l'*, attached at the inner end to the bed, and at the outer end to the rocker, and as the picker staff is drawn outward by a spring *m'*, attached to the end of the race beam and connected with the staff near its lower end by a strap *n'*, the tension of the spring always keeps the interposed strap *l'*, tight. The treadles *o'*, *o'*, which are operated in the usual way, communicate motion to the pickers for driving the shuttle by means of straps *p'*, *p'*, which pass over the inner ends of the rockers, so

that the rockers are kept on their beds by the flanches, back and front, by the straps of the treadles and by the interposed straps. In this way the shuttle motions are communicated with the least friction without noise, retaining the part which strikes the shuttle during the entire range of motion always parallel with the race beam, and the motions can be carried to the highest velocities without breaking.

The upper end of each picker staff is cut out at the front face to which is fitted a piece of raw hide *s'*, and the two are then embraced and bound together by a leather strap *t'*, the two back edges of the staff being notched to hold the leather strap in place. In this way the raw hide is firmly held in place, and pieces are prevented from breaking and flying off.

The temples made as represented at Figs. 7, and 8, of full size are, to be secured in the usual manner to the frame, one on each side. The stationary jaw *u'*, is lined with leather *v'*, or vulcanized India rubber, or any analogous substance, and the movable spring jaw *w'*, is made with teeth in the usual way so that the selvage of the fabric woven is gripped between the teeth and the lining, by which it is held to the required tension without injury.

Having thus pointed out the principles or characteristics which distinguish my invention from all other things before known, and the mode of constructing, applying and using the same which I have essayed with success,

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

1. Connecting the rocker of each picker staff, made and operated substantially as specified, with the bed on which it rocks by means of an interposed strap of leather or other flexible substance, attached at the inner end to the bed, and at the outer end to the rocker, substantially as, and for the purpose specified.

2. Forcing the shuttle binders inward against the shuttle while boxing, by a gradually increasing force, by means of arms on a rocker provided with a spring, which is acted upon by a pin on the connecting rod of the lay, substantially as described.

3. Securing the rawhide pickers to the inner face of the staffs by means of a leather strap or the equivalent thereof, embracing and binding the two together, substantially as described, to insure the firm union to resist the rapid blows and to prevent pieces of raw hide from breaking and flying as set forth.

RENSELAER REYNOLDS.

Witnesses:

CHAS. BAMBURGH,
WM. H. BISHOP.