(No Model.) 3 Sheets—Sheet 1.

J. RUSH & E. OLDFIELD.

ELECTRIC STOPPING MECHANISM FOR LOOMS.

No. 384,934. Patented June 19, 1888.

Fig. 1.

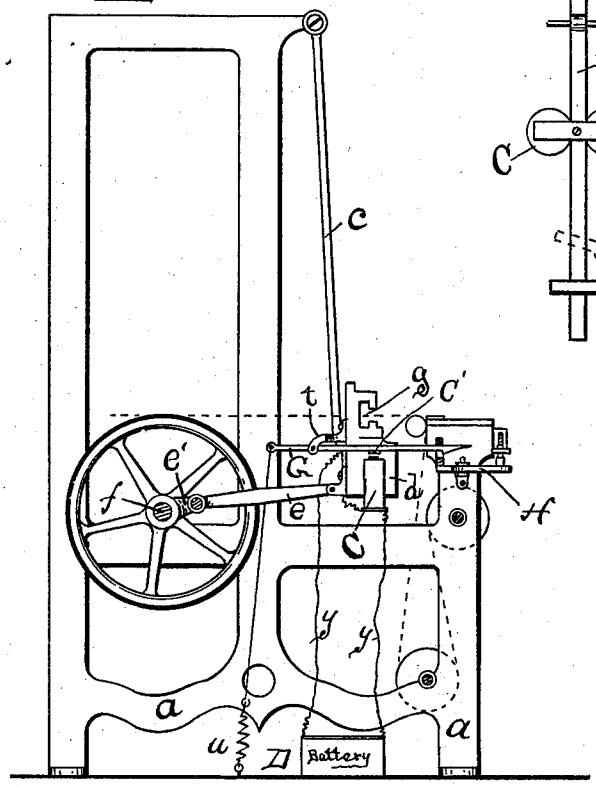
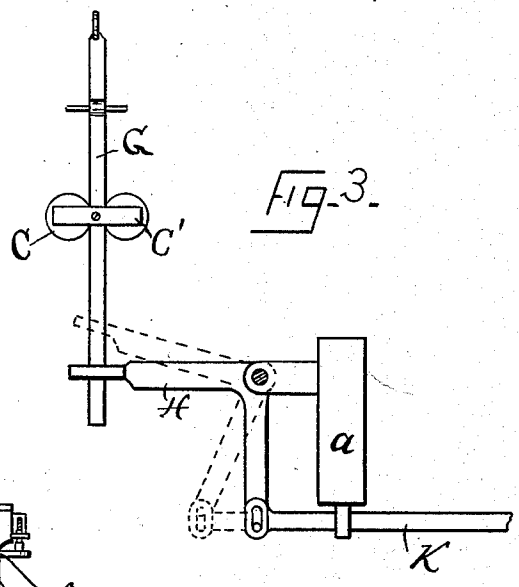


Fig. 3.



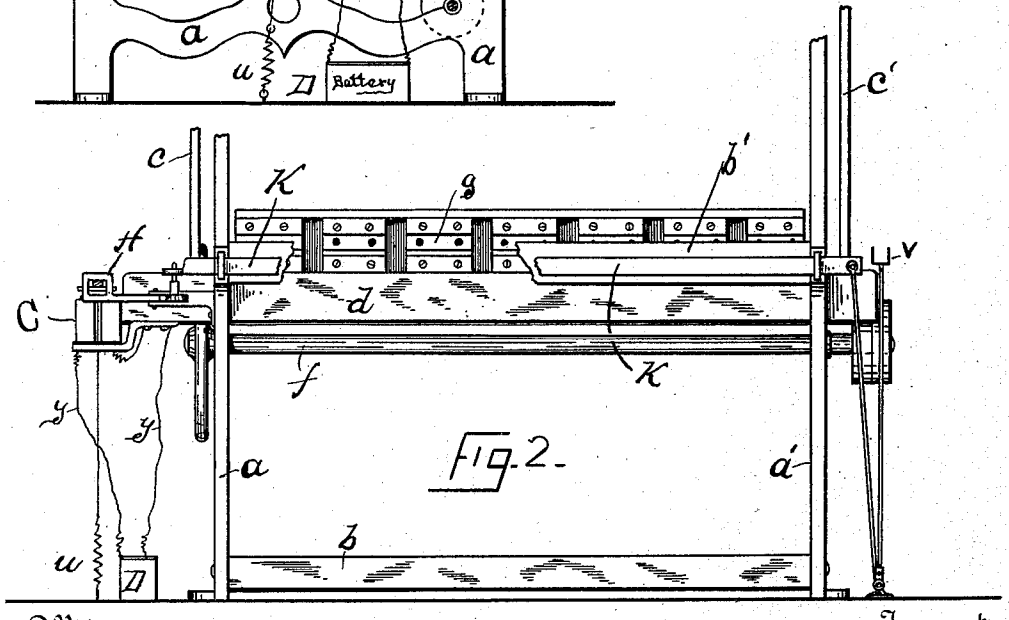


Fig. 2.

Witnesses.
A. J. Coultas.
Allen Tenny.

Inventors.
John Rush
Edwin Oldfield.
By their Attorney
Frank H. Allen

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J. RUSH & E. OLDFIELD.

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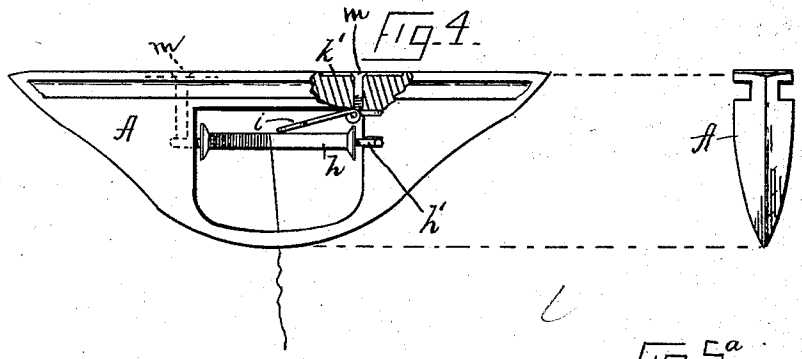


Fig. 4.

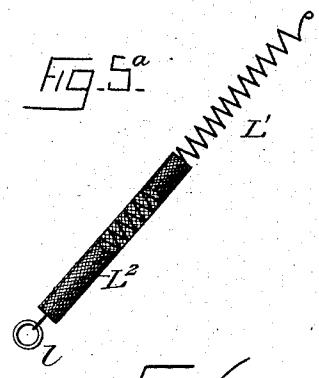


Fig. 5a.

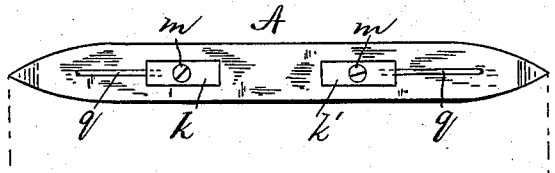
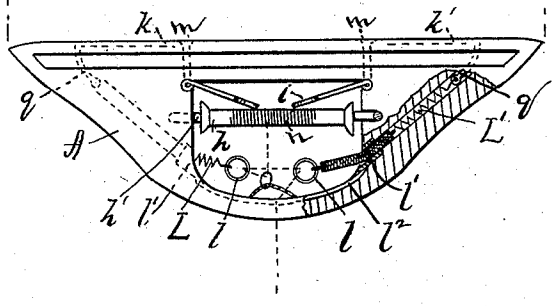


Fig. 5.



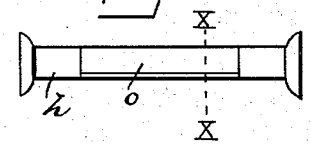


Fig. 6.

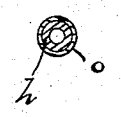


Fig. 7.

Witnesses
A. J. Coultas.
Allen Tenny.

Inventors.
John Rush,
Edwin Oldfield.
By their Attorney
Frank H. Allen

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J. RUSH & E. OLDFIELD.

ELECTRIC STOPPING MECHANISM FOR LOOMS.

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Fig. 8.

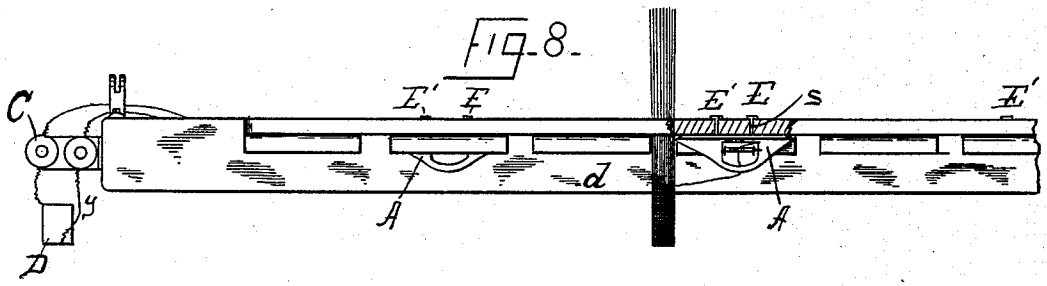


Fig. 9.

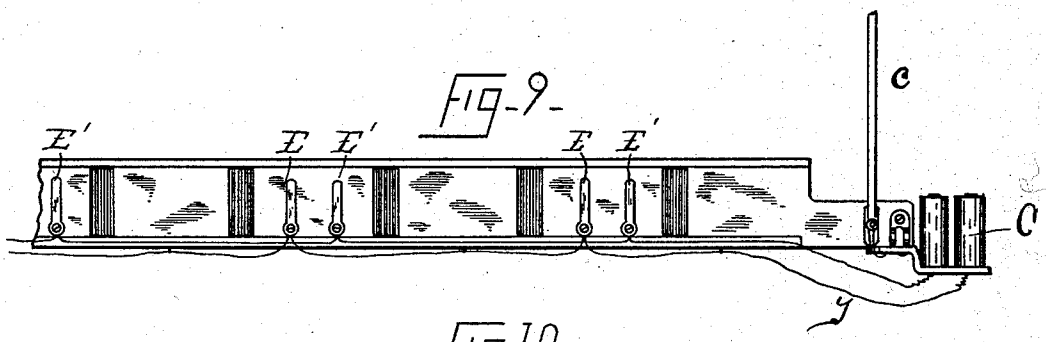


Fig. 10.

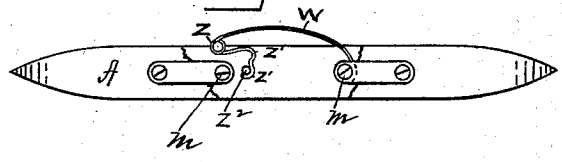
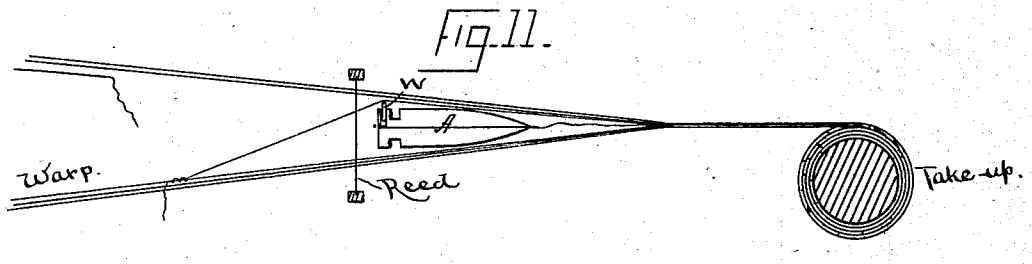


Fig. 11.



Witnesses.
A. J. Coultas
Allen Tenney.

Inventor.
John Rush.
Edwin Oldfield.
By their Attorney
Frank P. Allen

UNITED STATES PATENT OFFICE.

JOHN RUSH AND EDWIN OLDFIELD, OF NORWICH, CONNECTICUT.

ELECTRIC STOPPING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 384,934, dated June 19, 1888.

Application filed December 1, 1887. Serial No. 256,629. (No model.)

To all whom it may concern:

Be it known that we, JOHN RUSH, a subject of the Queen of Great Britain, and EDWIN OLDFIELD, a citizen of the United States, both residents of Norwich, in the county of New London and State of Connecticut, have made certain new and useful Improvements in Electric Stopping Mechanism for Looms, which improvements are fully set forth and described in the following specification, reference being had to the accompanying three sheets of drawings.

Our improvements are applicable to the various classes of looms in which a shuttle is employed to carry the weft or filling; but they are especially valuable when applied to that class of looms in which a multiple of shuttles is used, as in weaving ribbons, webbing, or other narrow fabrics.

The object of our invention is to provide mechanism which will act automatically to stop the loom when the filling-thread in any one of the multiple of shuttles breaks or runs nearly out, or when one or more of the warp-threads break. In running such looms (those having a multiple of shuttles) the operator is taxed to his utmost capacity in keeping the several shuttles supplied with filling and in watching both the warp and the finished fabric. In spite of the most careful attention the bobbin in one or more shuttles will occasionally run out unnoticed, or a warp-thread break, and as a result the entire loom must be stopped until the operator can pick back the spoiled fabric and start in the new filling, or piece up the broken warp, as the case may be. This is not only annoying, but causes a loss of time, which is very expensive.

Our invention for overcoming this difficulty consists, briefly, of a latch operated by an electro-magnet to ship the driving-belt and stop the loom when the filling breaks or is nearly exhausted in any one of the shuttles, or when a warp-thread breaks, the electrical circuit being completed through the shuttle in each case.

To illustrate our improvements we have annexed hereto several drawings, in which Figure 1 is a side elevation of such portions of a narrow-fabric loom as are necessary to explain our devices, and Fig. 2 is a front side elevation of a similar loom with the upper rail and take-up mechanism removed. Fig. 3 is a plan, somewhat enlarged, of the magnet and levers which operate together to move the belt-shipper to stop the loom. Fig. 4 shows a broken plan and an end view of a shuttle for ribbon-weaving, with a metallic bobbin arranged in a simple manner for making the electrical connection when the filling runs out; and Fig. 5 shows plan and rear side views of a similar shuttle in which a wire-covered wooden bobbin is used. Fig. 5ª is an enlarged detached view of spring L′, showing the manner of insulating a portion thereof. In Fig. 6 we have shown a wooden bobbin with a jacket of sheet metal, and in Fig. 7 a cross section of the same on line X X of Fig. 6. Fig. 8 is a broken top view of a portion of the lathe or batten, showing shuttles in operative position therein; and Fig. 9 is a broken rear view of said batten, illustrating the manner of making the electrical connections with the said shuttles. Fig. 10 is a rear view of a shuttle having attached thereto our device for operating with a broken warp-thread to stop the loom; and Fig. 11 shows the relative positions of the shuttle, reed, warp, and take-up. The last-named figure shows also the action of a broken warp-thread, as fully explained hereinafter.

Referring to the drawings, the letters *a a′* indicate the end frames of a narrow-fabric loom, connected in the usual manner by girders *b b′*. Said end frames project well upward, and have hinged to their upper ends swords *c c′*, whose lower ends are secured to the so-called "lathe" or "batten" *d*, said batten being swung forward and backward in practice by connecting-rods *e* and cranks *e′*, carried by the main shaft *f*.

Our improvements are here shown as applied to a loom having a multiple of shuttles, A, which travel in the race *g* of batten *d*. The elementary parts thus far described are substantially as commonly constructed in this class of looms.

Referring now to Figs. 4 and 5, A indicates the body of a shuttle having its central portion cut away to receive the bobbin *h*, which carries the weft or filling thread. This bobbin rotates on an axial wire, *h′*, and the thread is delivered under a suitable tension attained

by one or more spring-brakes, *i*. One end of each of said brakes is formed with a spring-coil to give a proper degree of elasticity, and is secured in the main body of the shuttle. The opposite ends of said brakes bear on the filling and gradually work toward the bobbin as the filling is used out.

The shuttle shown in Fig. 4 is intended for use with a bobbin made entirely of metal, while that in Fig. 5 may be used with a wooden bobbin having only a jacket of metal. On the rear side or edge of the shuttle are metal plates *k k'*, preferably let in flush and secured to the shuttle-body by screws *m*. In the form of shuttle illustrated in Fig. 4 one of said screws is long enough to engage the brake-wire *i* and the other reaches the axial wire *h'*.

So long as the metal bobbin is completely covered by the filling-thread the brake is kept from contact with said bobbin; but when said filling is nearly run off (as in Fig. 4) a metallic circuit is completed from one screw, *m*, through the axial wire, bobbin, and brake to the opposite screw. When it is desired to use a wooden bobbin, said circuit may be made as follows: Two spring-brakes are employed, each in contact with a screw, *m*, and the wooden bobbin is either wound spirally with fine wire, *n*, or is jacketed with sheet metal, as at *o* in Figs. 6 and 7. When so provided, a complete circuit is effected (as the filling runs nearly out) by the two brakes resting on the metal jacket of the bobbin. The batten *d* has attached to one end an electro-magnet, C.

D indicates a battery located in a convenient position, having running to the said electro-magnet and batten wires *y*, as is best illustrated in Figs. 1 and 2. Said wires extend along the rear side of the batten, (see Fig. 9,) and at stated distances, corresponding to the positions of the shuttles when the loom is stopped, connections are made with metallic spring-arms E E', secured to the rear side of the batten. These spring-arms are provided at their free ends with studs *s*, which reach through the batten into the path of the shuttles. To illustrate this construction more clearly, we have cut away a portion of the batten in Fig. 8, to which reference is made. As the shuttles travel back and forth in the raceway, the metal plates *k k'* brush lightly past the studs *s* at each movement. When the filling-thread is nearly run off, so that the brakes *i* are brought into contact with the bobbin, and when the shuttle comes into a position where its screws *m* register with and touch studs *s*, a complete metallic circuit is established, and the magnet C' immediately acts to draw down the armature thereof. Said armature is secured to a lever, G, pivoted in a bracket, *t*, fastened to the batten. The armature is held normally out of engagement with the magnet by a spring, *u*, secured to the floor or to the loom-frame and connected with the rear end of said lever G. The opposite end of said armature-lever is formed as a hook, which, as the batten swings back and forth, moves through an opening in one arm of a bell-crank lever, H, hinged to the end frame, *a*, of the loom. The other arm of said bell-crank lever is pivoted to a belt-shipper rod, K, supported in suitable bearings and extending along the front of the loom within easy reach of the operator, as commonly provided. The opposite end of rod K is connected with a belt-shipping fork, *v*, in such manner that the sliding movement of said rod K will cause the belt to be transferred from the tight to the loose pulley. So long as the hook-shaped end of the armature-lever G is under the control of spring *u* the said hook cannot engage the bell-crank lever to move it; but when the electrical circuit is completed (by the running off of the filling, as described above) magnet C instantly draws lever G downward, and the hook engages and rocks the bell-crank lever, which in turn actuates the shipper-rod and belt-shipper, and the loom stops.

It should be understood that the stopping of the loom occurs before the filling is entirely run off, leaving the finished woven fabric perfect and allowing the operator to start in the new filling without having to pick back or otherwise disturb said finished fabric.

Having described our stop-motion as controlled by the running off of the filling-thread, we will proceed to describe the action of the same when controlled by the breaking of the warp-threads. The shuttles used are constructed as above described, except that they have added thereto on the rear side a wire, *w*, shaped substantially as an arc of a circle. One end of said wire is looped loosely around one of the screws *m*, and the bow or central portion extends upward above the shuttle. (See Fig. 10.) The opposite or free end of said wire is formed with a spring-coil, *z*, and with two bends, *z'*, one above the other in such positions that either may engage a stud, z^2, fixed in the shuttle. Wire *w* is shown in Fig. 10 as elevated and the circuit broken. When drawn downward by a broken and tangled warp-thread, as we have described below, said wire is depressed until its spring-coil *z* is brought into contact with the second screw *m*, and is retained in such contact by the upper bend, *z'*. This closing of the electrical circuit causes the electro-magnet and the belt-shipping devices to act, precisely as before explained, to stop the loom.

The action of a broken warp-thread is more clearly seen by referring to Fig. 11, in which one of said threads is shown as broken and intertwined with the adjacent threads. This tangling of the threads becomes more complicated as the harness works up and down, until the tension on the broken thread is sufficient to force downward wire *w* as the shuttle shoots under it, and thus closes and completes the electrical circuit.

The foregoing describes the manner of completing the electrical circuit when a warp-thread breaks. To attain the same result when the filling-thread breaks, (as frequently oc-

curs,) we have made the following slight changes in the shuttle. Referring to Fig. 5, L L′ indicate delicate spiral springs, as commonly provided, to take up the slack of the filling-thread. When the shuttle is not threaded, these springs draw back into their respective recesses in the body of the shuttle, the rings *l* alone being exposed to view. We have connected the inner fixed ends of said springs with plates *k k′* by wires *q*, and by establishing a metallic connection between the entrances to the said recesses when a thread breaks and the springs snap back into the shuttle-body the rings *l* are brought into contact with said metallic connection and the electrical circuit is completed. The metallic connection between the two spring-recesses is provided by inserting metal bushings *l′* in the entrance of each recess and by connecting said bushings by a wire or strip of sheet metal, *l²*, passing from one to the other. A portion of spring L′ is insulated by webbing, L², or other non-conductor, so that when its ring *l* is drawn outward, as in the act of threading the shuttle, the circuit is broken and is kept so so long as the filling remains intact; but the instant said thread breaks and relieves the springs they snap back into the recesses, allowing the current of electricity to reach the electro magnet and thus stop the loom.

Fig. 5 shows the common method of threading a shuttle of this class, the thread being indicated by dotted lines. Said thread is first passed through an idle-ring of glass hung loosely on a cord attached to the bow of the shuttle, thence passes through one of the rings *l*, thence through the companion ring, and finally outward through the shuttle-bow.

The devices which we have added to accomplish the desired results are not expensive when compared with the saving of time and material effected, and they may be readily applied to looms of ordinary construction.

We claim as our invention—

1. In combination with the belt-shipper, shipper-rod, and batten of a loom, devices for actuating said shipper to effect the stopping of the loom, consisting of an electro-magnet moving with the batten, an armature for said magnet formed as a latch or hook, a bell-crank lever, one of whose arms is pivoted to the said shipper-rod and the other arm is in the path of said armature-hook, as set forth, a battery, wire-connections leading from said magnet and battery into the path of the shuttle, and a shuttle with metal-jacketed bobbin having wires leading therefrom adapted to engage the wire-connections first above described, as and for the object specified.

2. In combination with the belt-shipper, shipper-rod, and batten of a loom, an electro-magnet moving with the batten, an armature for said magnet formed as a latch or hook, a bell-crank lever, one of whose arms is connected to said shipper-rod and the other arm is in the path of said armature, as set forth, a battery, wire-connections leading from said magnet and battery into the path of the shuttle, and a shuttle provided with the bow-shaped wire *w*, plates *k k′*, screws *m m*, and pin *z²*, said wire *w* being formed with retaining-bends *z′*, all substantially as and for the purpose specified.

3. The combination, with the belt-shipper and batten of a loom, of the slidable rod K, a bell-crank lever, one of whose arms is pivoted to said rod, a reciprocating electro-magnet whose armature is provided with a hook adapted to engage and operate said bell-crank lever when an electrical current is passed through said magnet, and devices, as herein described, for controlling said electrical current, for the purpose specified.

4. In combination with the batten and belt-shipper of a loom, an electro-magnet, a battery, wires leading from said magnet and battery into the path of the shuttle, mechanism connected therewith for moving the belt-shipper, as herein set forth, and a shuttle having combined therein a metal-jacketed bobbin, spring-brakes *i*, screws *m*, and plates *k k′*, all substantially as and for the purpose specified.

5. In combination with the batten and belt-shipper of a loom, an electro-magnet and a battery, wires leading therefrom into the path of the shuttle, mechanism for moving the belt-shipper, and a shuttle having combined therein plates *k k′*, screws *m*, wires *w*, and stud *z²*, all being substantially as and for the purpose specified.

6. In combination with the batten and belt-shipper of a loom, an electro-magnet and battery, wires leading therefrom into the path of the shuttle, mechanism connected therewith for moving the belt-shipper, and a shuttle having combined therein plates *k k′*, wires *g*, springs L L′, with rings *l l*, bushings *l′*, and connecting-wires *l²*, all being substantially as described, and for the object set forth.

JOHN RUSH.
EDWIN OLDFIELD.

Witnesses:
JOSEPH WILLIAMSON,
FRANK H. ALLEN.