May 5, 1936. J. LAWSON ET AL 2,039,725

JACQUARD STRIP

Filed May 28, 1931 3 Sheets-Sheet 1

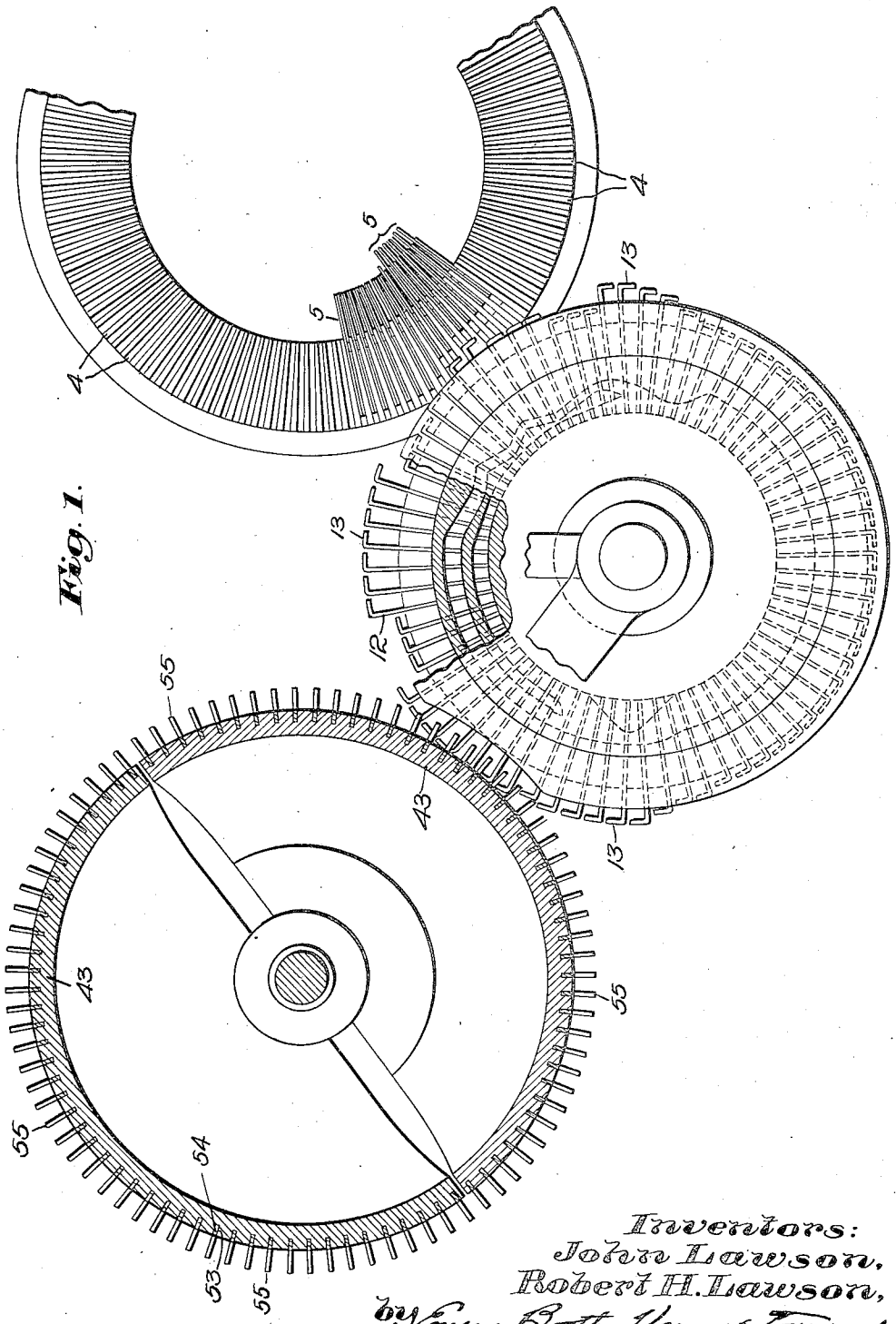


Fig. 1.

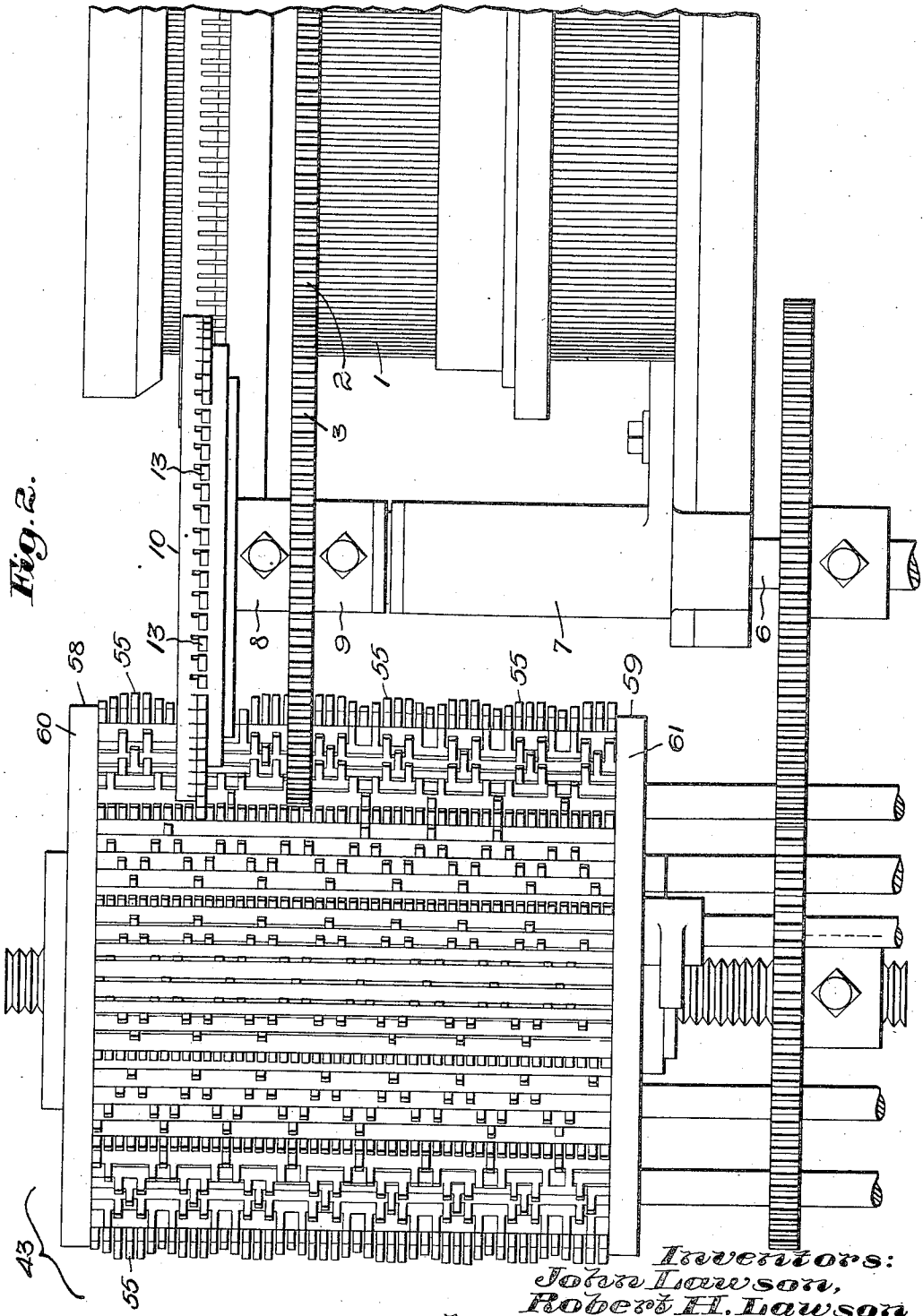
Inventors:
John Lawson,
Robert H. Lawson,
by Emery, Booth, Varney & Townsend
Attys.

May 5, 1936. J. LAWSON ET AL 2,039,725

JACQUARD STRIP

Filed May 28, 1931 3 Sheets-Sheet 2

Fig. 2.



Inventors:
John Lawson,
Robert H. Lawson
by Emery, Booth, Varney & Townsend
Attys.

May 5, 1936. J. LAWSON ET AL 2,039,725

JACQUARD STRIP

Filed May 28, 1931 3 Sheets-Sheet 3

Fig. 4.

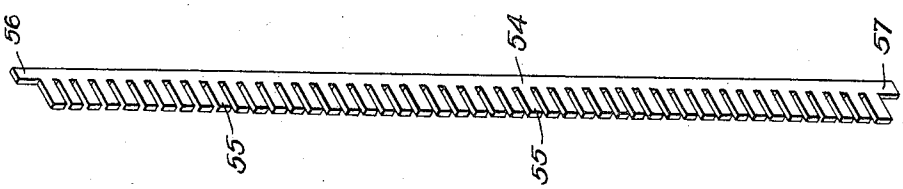
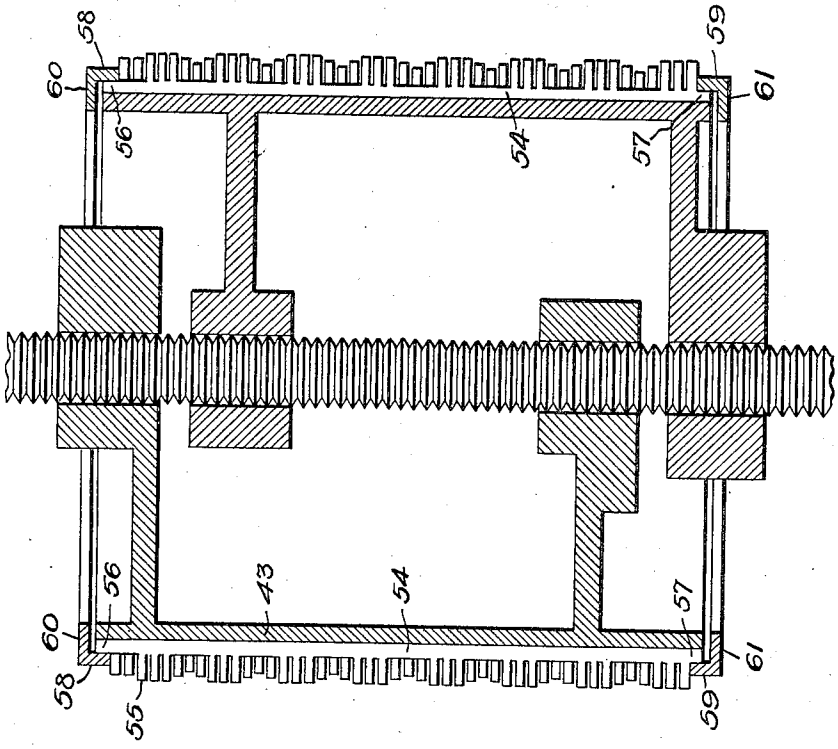


Fig. 3.



Inventors:
John Lawson,
Robert H. Lawson,
by Emery, Booth, Vamey & Townsend
Attys.

Patented May 5, 1936 2,039,725

UNITED STATES PATENT OFFICE

2,039,725

JACQUARD STRIP

John Lawson, Bristol, and Robert H. Lawson, Pawtucket, R. I., assignors to Hemphill Company, Pawtucket, R. I., a corporation of Massachusetts

Application May 28, 1931, Serial No. 540,584

4 Claims. (Cl. 66—156)

This application is a continuation in part of our co-pending Patent No. 1,872,597.

This invention relates to jacquard or like strips and to the method of making same.

While our invention may in certain cases be used in other relations, it is particularly adapted for use in connection with knitting machines for controlling the pattern of the fabric.

In order that the principle of the invention may be readily understood, we have disclosed a single embodiment thereof in the accompanying drawings, wherein—

Fig. 1 is a view, partly in plan and partly in horizontal section, of a needle cylinder, its sinker ring, the dial disk with its jacks and the jacquard drum;

Fig. 2 is a front elevation of the needle cylinder, dial disk and jacquard drum;

Fig. 3 is a vertical transverse section taken through the jacquard drum and showing two of the jacquard strips removably positioned in lengthwise grooves thereof; and

Fig. 4 is a perspective view of one of the jacquard strips.

In accordance with our invention and as disclosed in our parent application Ser. No. 177,262, there is provided an upright jacquard drum having throughout its entire periphery lengthwise extending slots in each of which a jacquard strip is adapted to be position. The said drum, in the preferred embodiment of the invention and as disclosed in said parent application, is rotated and also moved axially, and in the said movement thereof the said jacquard strips control certain instrumentalities which in turn control the pattern or stitch variation. While our invention is not limited to the employment or use of such mechanism for controlling plating and reverse plating, an important use of the invention is for controlling the knitting of two threads fed in a plating relation in such manner that either normal or reverse plating might occur. The present invention pertains more particularly to the jacquard strip itself and to the manner of making the same, as well as a pattern drum or pattern wheel having the strips removably supported in lengthwise extending grooves thereof.

While the invention herein claimed may be employed in connection with other types of knitting machines, we preferably use the same with that type of knitting machine known as the Banner and disclosed in the patent to Hemphill No. 933,443. Our present invention is particularly useful for effecting patterning through plating and reverse plating, and to that end we may and preferably do employ the principles of operation disclosed in the patent to Robert H. Lawson, No. 1,605,896, and refer to that patent for a full disclosure of special instrumentalities and regular web holders, one of each of which is positioned in each of the grooves of the sinker ring. Relative movement of the needles and said instrumentalities, and preferably movement of said instrumentalities transversely of the needle series, effects yarn or thread engagement, so that two plating yarns which are fed in a plating relation are reversed in position, desirably during the loop formation, so that the face or front thread appears at the back of the fabric, and vice versa, all as fully disclosed in said Patent No. 1,605,896, to which reference is made for complete description.

Referring to the drawings, we have in Fig. 2 represented at 1 a needle cylinder of a circular hosiery knitting machine, such, for example, as that shown in the Lawson Patent No. 1,605,896. The said cylinder, being in this embodiment of the invention rotatable, has fast thereon a gear 2 meshing with a gear 3. At its upper end the knitting machine is provided with any desired and preferably the usual web holder bed ring provided with radial grooves represented at 4 in Fig. 1. Each of said grooves receives not only the usual web holder or so-called sinker, such as shown in the said Lawson Patent No. 1,605,896, but also receives a special instrumentality 5 of the general character shown in said Patent No. 1,605,896, said elements being wholly disconnected from each other and capable of independent radial movement in the said grooves. For further description of the manner in which said instrumentalities cooperate in effecting changes from plating to reverse plating, reference is made to said patent.

The gear 3 is fast for rotating movement upon a spindle 6. Said spindle 6 is supported in a suitable bearing 7 mounted in the bed plate of the machine. Upon the spindle 6 are fast collars 8, 9, and fast upon the upper end of said spindle is a jack receiving dial disk indicated generally at 10, and which is in transverse alignment with the sinker cam ring. The said disk is rotated in a clockwise direction and has upon its upper face radial grooves receiving jacks 12, the outer end of each of which is bent at substantially right angles, though upon an arc, as indicated at 13. We have shown each bent end 13 as of sufficient extent to engage and thereupon move radially inward two special instrumentalities 5, but if desired each of said bent

ends 13 may control but a single special instrumentality, in which case we will provide as many jacks 12 as there are special instrumentalities 5.

Having referred generally to the arrangement of the jacks 12 and the effect of their movement from their innermost position, where they do not act upon the corresponding instrumentalities 5, into their outermost position, where they engage corresponding instrumentalities and push them inward for effecting reverse plating, which change in position of the jacks 12 is controlled by the jacquard drum, we will now describe one form of jacquard drum or member which may be employed for the purpose.

Our invention is not limited to any particular form of jacquard controlling member. We prefer, however, to use a drum which is constantly rotated in one direction and which desirably is gradually racked or moved step by step axially, so that the formations hereinafter referred to upon the jacquard drum may be presented to and act upon the jacks 12.

We provide the jacquard drum, in the manner hereinafter described, with any desired number of circumferential rows of projections or formations, each circumferential row corresponding to one course in the knitting operation, and it will therefore be understood that the number of possible projections or formations in each such circumferential row may be the same as the number of needles in the knitting machine, so that each formation in each circumferential row of the jacquard drum controls a loop or stitch in that course. In a knitting machine of coarse gauge especially, we provide as many possible projections in each row as there are needles in the needle cylinder.

While the formation upon the jacquard drum may be of any suitable character, our invention not being limited or restricted in this respect, we preferably provide a number of strips which may also be referred to as tricks or strip-like pattern elements which are inserted in or applied to the circumference of the jacquard drum lengthwise of said drum, and upon each strip we provide for a number of projections, the total possible number representing the number of courses of the stocking or other knitted article that may thus be controlled, assuming that the drum is moved or racked lengthwise for each revolution of the needle cylinder. If each such strip had all the possible projections thereon it would follow that in each course, the corresponding jack would be moved inward viewing Fig. 1, and hence the corresponding pair of special instrumentalities 5 would remain in their outer position and normal plating would result. If, however, one or more projections is or are removed from any one strip, such removal results in reverse plating at the needles corresponding thereto in the course or courses where such projection or projections is or are removed, all of which will be evident from the foregoing description.

Assuming for purposes of illustration that the jacquard drum has forty-eight circumferential rows or projections, a constant step-by-step movement of the jacquard drum axially would control each stitch in each of said forty-eight courses without any necessary duplication of the pattern to any extent whatever throughout the forty-eight courses, and upon similar return movement of the drum, whatever pattern was produced during said forty-eight courses, is produced in a reverse direction in the next forty-eight courses.

The jacquard drum is indicated generally at 43. The entire outer surface of the drum is lengthwise grooved, as indicated at 53, in a manner generally similar to a needle cylinder, and in each of said grooves is positioned a strip 54 shown in position in Figs. 2 and 3 and shown removed in Fig. 4. Each strip 54 has, in the selected embodiment of the invention, forty-eight possible projections or formations 55 slightly spaced from each other. Such strip, for convenience of description, we refer to as a jack selector strip. It may also be termed a strip-like element, pattern element or member, or trick. Such strip is preferably made of metal and, according to the design or pattern, the projections 55 which are not employed are removed before the strip is inserted. It will be evident that the strips must be and are very accurately relatively positioned in their respective grooves 53, so that the corresponding projection 55 for each course of the fabric are in exact circumferential alignment. Each of said strips 54 has an upper reduced end 56 and a lower reduced end 57 which are respectively engaged by the flanges 58, 59 or semi-circular caps 60, 61, which are secured to the ends of the drum by screws or otherwise after all of the strips have been positioned.

In a circular, independent needle, hosiery knitting machine, such as shown in the Robert H. Lawson Patent No. 1,605,896 referred to in our original specification, when of fine gauge, there would be 240 or 260 needles in the needle circle. In a coarse gauge machine of that same type, there would be or might be 220 needles in the needle circle. As set forth in our original application, the number of strips in the jacquard drum 43 would, in the case of coarse gauge machines, be equal to the number of needles in the needle circle, and in a fine gauge machine, we there represented the employment of one strip for every two next adjacent needles. Inasmuch as each jacquard strip may have, according to the call of the pattern forty-eight butts, or the pattern may call for any lesser number of butts on the jacquard strip, and arranged at any place or places thereon, it is evident that our invention is of great practical importance, as the making of the jacquard strips all alike (as is done in accordance with our original disclosure in the application of which this is a division) and the subsequent removal of the not-needed butt or butts when it comes to placing the jacquard strips in the drum according to the call of the pattern, avoids the necessity of making dies, jigs, or other tools, for each and every position and number of butts.

The great advantage of our invention is at once evident when it is realized that a mathematical computation proves that with 240 needles and a strip for each needle, there are 280 trillion or more possible arrangements of a butt or butts on a strip, if the number of butts varies from one to forty-eight, and the one or more butts be located anywhere on the strip along the edge that is the outer, active edge when the butt is in position in the jacquard drum 43.

Having thus described one illustrative embodiment of the invention and the best mode known to us for practising the method of the invention, it is to be understood that although specific terms are employed, they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claims.

We claim:

1. A jacquard strip for use in a knitting machine comprising a metallic piece elongated but thin and having a large number of projections all extending from one face thereof, all of said projections being of the same size and each adapted to control a single course in the knitting, each projection being close to the next one on either side thereof and each projection being adapted to be readily severed from the strip in accordance with the pattern desired, and all such projections in the strip controlling stitch formations in the same wale of the fabric, said strip having projecting ends in the plane of the strip adapted to be engaged by holding means for fixedly but removably holding the same in position upon the jacquard strip carrier.

2. A multiplicity of jacquard strips adapted for use upon a jacquard drum in parallel relationship thereon, each such strip comprising a metallic piece elongated but thin and having a large number of projections, all extending from one face only thereof, all of said projections being of the same size and each adapted to control a single course in the knitting operation, each of said projections being close to the next one on either side thereof, and each projection being removable, from the strip in accordance with the pattern desired, each such strip having opposite projecting ends in the plane of the strip adapted to be engaged by the securing means of the jacquard drum, whereby the multiplicity of strips may be readily released from said fixed, pattern controlling position.

3. A multiplicity of jacquard strips adapted for use upon a jacquard drum in parallel relationship thereon, each such strip comprising a metallic piece elongated but thin and having a large number of projections, all extending from one face only thereof, all of said projections being of the same size and each adapted to control a single course in the knitting operation, each of said projections being close to the next one on either side thereof, and each projection being removable from the strip in accordance with the pattern desired, each said strip having at its respective ends projections in the plane of the strip, over which ends cap plates of the jacquard drum are adapted to be positioned, whereby the jacquard strips are held in place upon the drum by said cap plates, thereby permitting the multiplicity of strips to be readily released from the fixed pattern controlling position.

4. In a circular, independent needle, hosiery knitting machine of the rotary needle cylinder type having substantially 220 needles in the needle circle, and in combination therewith, a jacquard drum having longitudinal grooves the length thereof and in number extending entirely about the circumference of the said drum, and each of narrow width and of depth similar to the needle grooves of the needle cylinder, and the number of said grooves in the said drum being, in a coarse gauge machine of the said type, equal to the number of needle grooves in the needle cylinder, and a series of thin, metallic jacquard strips equal in number to the number of said grooves in the jacquard drum and of a thickness corresponding to the width of the grooves and removably positioned and secured therein, each said strip being of metal and having integrally extending from the outer or active edge of the strip and in the plane only of the said strip and of equal thickness with the body of the said strip, a straight butt or butts, the number and the position of the said butts on each positioned strip being dependent upon the call of the hosiery pattern, the butts not needed according to the call of the pattern having been removed from each strip after the manufacture of the strip, whereby all the strips as manufactured may be identical in shape and with all the butts thereon, and the butt or butts not called for by the hosiery pattern may be removed from each strip prior to the positioning of that strip in the jacquard drum, said jacquard drum and needle cylinder being rotatable in synchronism.

JOHN LAWSON.
ROBERT H. LAWSON.