May 11, 1926. 1,584,680

G. B. AMBLER

NEEDLE LOOM

Filed April 11, 1922 2 Sheets-Sheet 1

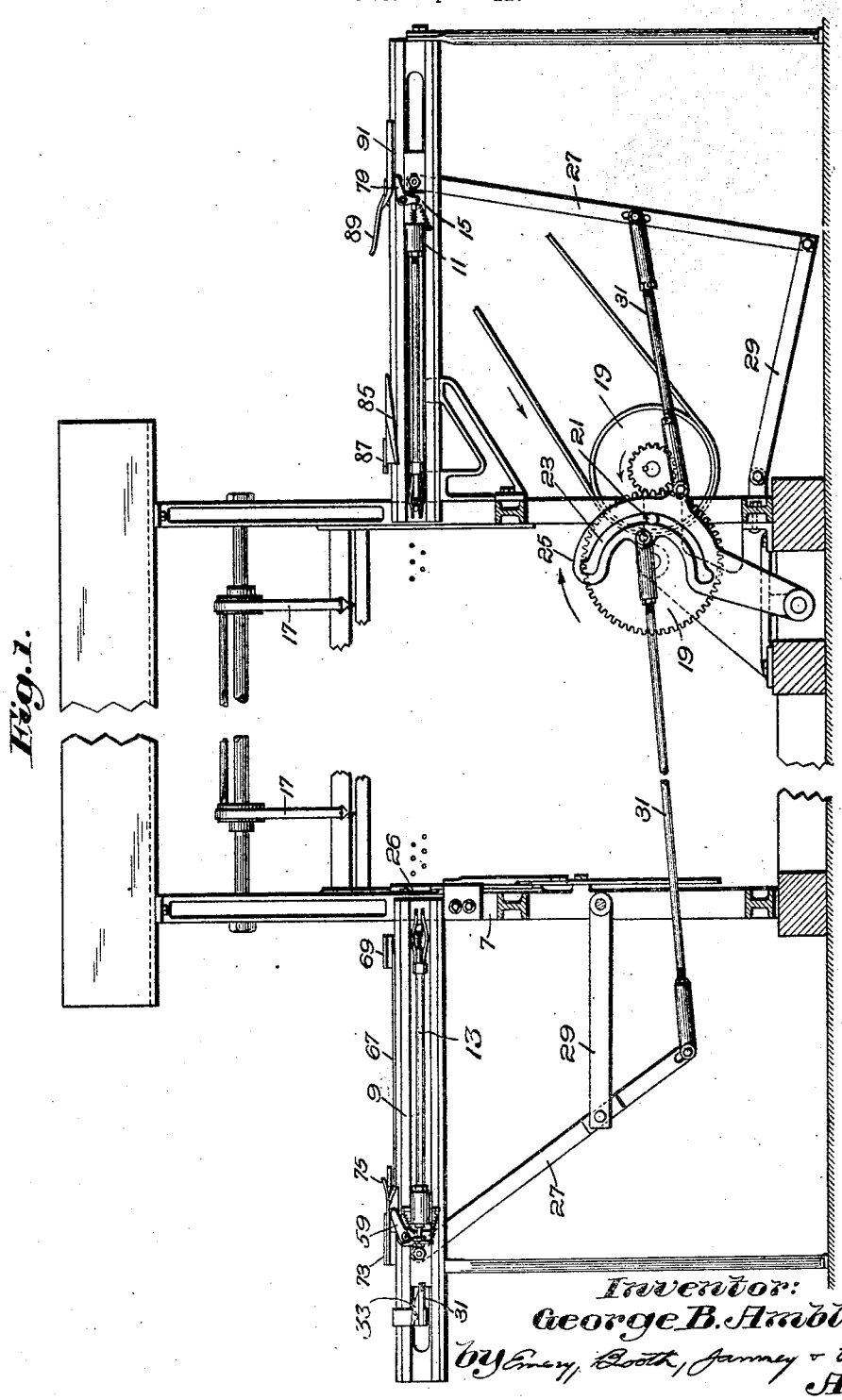



Fig. 1.

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Fig. 2a

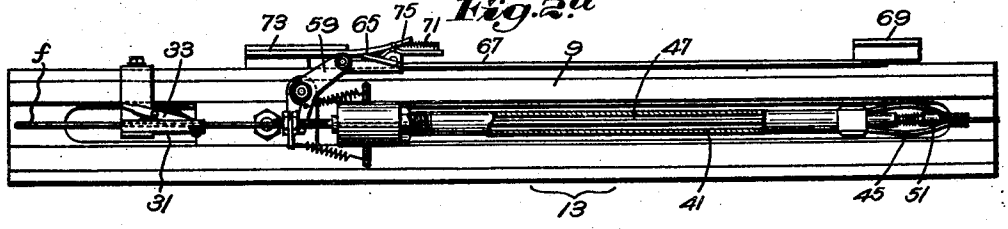



Fig. 2b

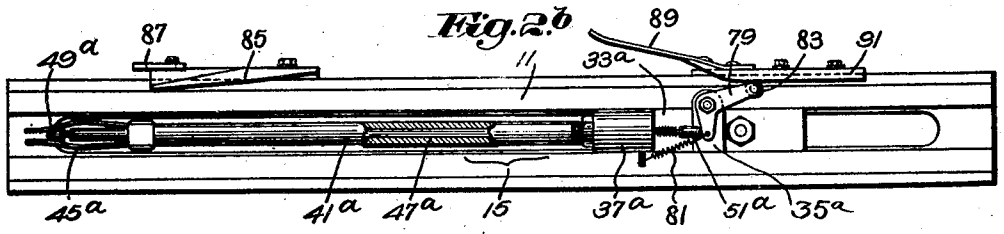



Fig. 3a

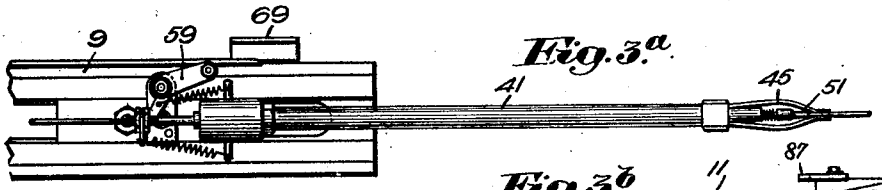



Fig. 3b

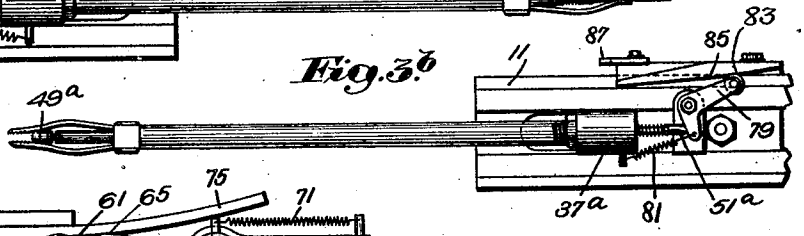
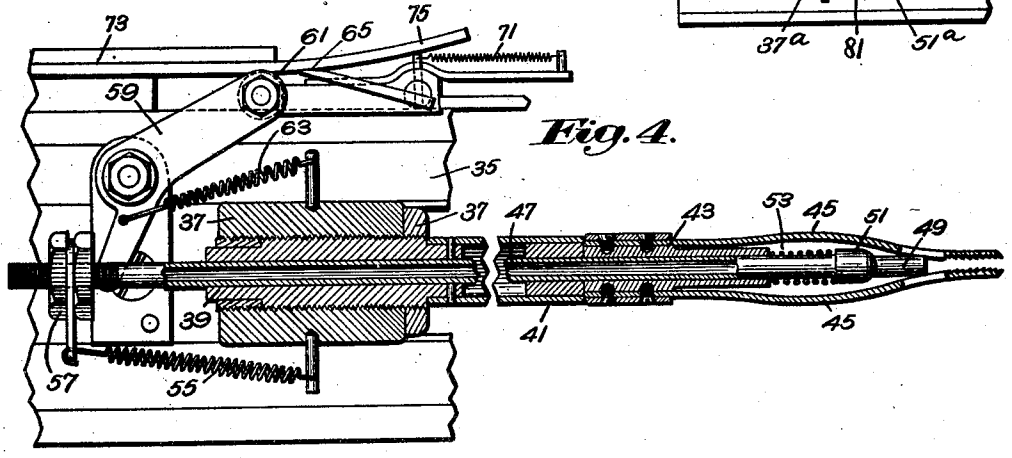



Fig. 4.




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# UNITED STATES PATENT OFFICE.

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## NEEDLE LOOM.

Application filed April 11, 1922. Serial No. 551,513.

This invention relates to looms of that type wherein the filling strand is taken from a relatively fixed supply and drawn through the shed and the purpose of the invention is to provide certain improvements in the picking mechanism of such a loom.

My invention will best be understood by reference to the following description of the illustrative embodiment thereof shown by way of example in the accompanying drawings, wherein:

Fig. 1 is a transverse section through a loom with parts omitted showing in elevation such portions thereof as are necessary to an understanding of my invention;

Figs. $2^a$ and $2^b$ are elevations of the left and right hand picking devices or needles respectively in their retracted positions;

Figs. $3^a$ and $3^b$ are broken elevations of the left and right hand picking devices or needles respectively in their protracted positions; and

Fig. 4 is a broken central longitudinal section through the left hand needle on an enlarged scale.

As an example of my invention I have here shown a loom having two picking devices, which I will call needles, one adapted to carry the filling into the shed substantially to the center thereof and the other adapted to reach into the shed and seize the filling presented to it by the first needle and draw it through the rest of the shed. In Fig. 1 the first needle is on the left hand and the second on the right and for convenience I will herein refer to them as the right and left hand needles. It will be understood, however, that various features of my invention are adapted to a single needle loom.

Referring to Fig. 1 at either side of the frame 7 of the loom are mounted guideways 9 and 11 along which the picking devices or needles 13 and 15 are reciprocated, these needles being advanced into the shed and retracted out therefrom by the in and out reciprocating movement. The shed may be formed in any convenient manner. I have here indicated shed-forming mechanism by the illustration of suitable harness supports 17. For operating the picking devices there may be provided a driven wheel 19 having a wrist pin 21 adapted to enter the arcuate slot 23 in the rocker arm 25. For the greater portion of its length the slot 23 is formed as a circular arc of the same radius as the distance of the wrist pin from its axis of revolution but preferably the terminal portions of the slot curve outwardly. As the wheel rotates and the parts are in the position shown in Fig. 1, the rocker arm will remain stationary while the pin is in the circular portion of the slot but as it approaches the end of the slot the rocker arm will be started into motion with an easy action and without jar due to the outward curving of the terminal portions of the slot. As the pin then passes through the remaining portion of its path, it will cause a reciprocation of the rocker arm. An easy termination of the motion is provided in like manner. The motion of the rocker arm may be communicated to the picking devices to cause them to enter the shed, to retreat therefrom, and then to have a period of rest during which the filling may be severed by the cutter 26, beaten up and a new shed formed. The needles may be operated by rocking levers 27 pivoted thereto and supported by the links 29, suitable adjustable connecting rods 31 extending from the rocker arm 25 to the rocking levers 27.

Referring to Fig. $2^a$, I will next describe the left hand needle which carries the filling forward into the shed. Preferably there is mounted adjacent the outer end of the guide 9 a holder for the filling which may consist of a channelled support 31 in which the filling strand $f$ rests and against the bottom of which it is frictionally held by the spring pressed dog 33. In the form of the invention illustrated the holder 31 is adapted to receive the end of a filling strand of indefinite length from which a suitable length is severed by the cutter 26 after each pick. The needle 13 may conveniently be made hollow as hereinafter described to embrace the filling strand, which is seized by jaws at the inner end of the needle at proper times. Referring to Fig. 4, the picking device or needle 13 may embody a slide 35 having a boss 37 receiving the plug 39 on which is mounted a tube 41 forming the main portion of the body of the needle and a plug 43 in the outer end of this tube provides for the mounting of the resilient jaw members 45 which by their inherent resili-

ency normally tend to close. Suitable means are provided for operating the jaws against their inherent resiliency to open the same and herein the plugs 39 and 43 provide bearings for a central rod 47, which in this instance is tubular to permit the filling strand *f* to be threaded through the same, and the outer end 49 of this rod is presented between the jaws 45 and when thrust to the right in Fig. 4 to the position shown wedges them apart. A spring may be provided for normally moving the rod to one extreme position and herein I show a collar 51 on the rod between which and the inner end of the tube is interposed the helical compression spring 53. The action of the spring 53 may be reinforced by the tension spring 55 secured to the boss 37 and to the rod, in the latter instance conveniently between the nuts 57 which form an adjustable abutment on the outer end of the rod by means of which it may be operated against the action of these springs. To shift the rod a suitably shaped lever 59 is pivoted on the slide 35 and has one end cooperating with the abutment 57 and the other end provided with a cam roll or follower 61. A light spring 63 may be provided for swinging the lever counterclockwise for the purpose presently to be described.

I will next describe the particular means here shown for operating the jaws 45 of the needle in proper manner in order to carry the filling forward into the shed and deliver it to cooperating mechanism at the other side of the loom. Referring to Fig. 2ª, we may suppose the needle to be in retracted position, the filling strand *f* to be threaded through the hollow rod 47 and to project somewhat beyond the ends of the jaws 45. In this position the lever 59 is unrestrained and the spring 53 holds the jaws 45 open. As the needle advances to the right the follower on the lever 59 passes along the downwardly and inwardly sloping guide surface 65 and the lever is swung and the follower in its depressed position runs along the fixed guide surface 67 extending along the major portion of the length of the guideway 31. As the lever is rocked the jaws 45 are permitted to close on and grip the filling strand *f* and by the action of the guide 67 they are held closed during the greater portion of the inward motion of the needle and consequently the strand is drawn forward into the shed. As the needle approaches its inner limit of movement, the follower passes the end of the surface 67 and the spring 63 quickly rocks the lever upwardly, a suitable stop surface 69 preferably being provided to limit its movement. The rod 47 is thus released from the action of the spring 53 and the jaws 45 are wedged open and release the filling which is grasped by cooperating means on the other end of the loom. The needle then is moved to the left and the follower is then on the further side of the guide surface 67, the inner end of which may conveniently be bevelled off as shown to ensure that the follower shall pass to the further side in its retreating movement, and the jaws remain open during the major portion of the outward movement of the needle, slipping freely over the filling strand. Adjacent the outer limit of movement of the needle suitable means are provided for switching the follower to the opposite side of the guide 67 to return the parts to the position shown in Fig. 2ª. For this purpose the guide surface 65 already referred to may be pivotally mounted as at the end of the guide 67 and form in effect an extension of the inner face of the same. The guide 65 thus forms a switch which is normally swung upwardly by a spring 71 secured to an arm projecting from the pivot thereof and extends in a generally upwardly and outwardly sloping direction from the inner face of guide 67 towards the guide surface 73, which latter is provided with an inner portion 75 overlapping the outer portion of the guide 67 and sloping outwardly and downwardly towards the same. This portion 75 receives the follower as it retreats on the outer side of the surface 67. The follower displaces the switch member 65 against the action of the spring 71 and rides to the position shown in Fig. 2ª, the switch 65 snapping up behind it, and the switch is then in such position that on the succeeding pick, as the needle is advanced again, the follower will contact with the under side of this switch and be guided to the under surface of the guide 67.

I will next describe the construction here shown of the right hand needle which, extending through the shed, grasps the filling and pulls it therethrough in its retracting movement. In the present instance this needle takes the filling from the left hand needle which has carried the filling into the shed on its protracting movement. The right hand needle, as shown in Figs. 2ᵇ and 3ᵇ, may be in some respects similar in construction to the needle 13 and comprise the slide 35ª, boss 37ª, tube 41ª and jaws 45ª, substantially similar to the parts 35, 37, 41 and 45 already described. Coaxially organized with the tube 41ª is also a rod 47ª, which, however, need not be tubular, provided with a wedging surface 49ª for spreading the jaws 45ª. The outer end of the rod may be provided with a collar 51ª between which and the tubular body of the needle is interposed a helical compression spring 53ª which in this instance normally tends to shift the rod to the right withdrawing the wedging surface 49ª from between the jaws and permitting them to close through their

inherent resiliency. The lever 79, pivoted on the slide 35ª, is normally held against the outer end of the rod 47ª by a light spring 81 and carries at its outer end the cam roll or follower 83.

I will next describe the means cooperating with the follower 83 for operating the jaws 45ª of the right hand needle. Let us suppose the needle to be in its retracted position shown in Fig. 2ᵇ. As it advances into the shed the jaws have no particular function until they approach the filling which in the present instance is carried into the shed from the other side by the left hand needle. As the needle 15 approaches its inner limit of movement, the follower 83 rides under the inwardly and downwardly sloping cam surface 85 which rocks the lever 79 clockwise, pushes rod 47ª to the left and opens the jaws 45 so that they pass over the end of the filling which is presented by the needle 13 in the manner shown in Fig. 3ª. This action is shown by Fig. 3ᵇ. At the extreme limit of movement the follower passes off the surface 85 and is released from the action of the spring 53ª and swings outwardly and the jaws are closed on the filling. A suitable stop surface 87 may be provided to limit the upward swing of the lever 79. Preferably the inner end of the surface 85 terminates in a thin edge to facilitate the release of the cam roll to the upper or outer side of the cam surface 85 so that in the retracting movement of the needle 15 the follower remains in its outer position and the jaws remain closed while the needle pulls the filling through the shed. At the extreme end of this movement the jaws are again opened to release the filling to permit it to be severed and beaten up and for this purpose there is provided adjacent the position of the follower at the outer limit of movement of the needle a fixed cam surface 89 sloping outwardly and downwardly to a rise 91 against which the follower comes to rest during the period when the needle is stationary. The cam 89 rocks the lever clockwise, the rod 37 is pushed to the left and the jaws are opened to release the filling. It will be clear from Fig. 2ᵇ that the lifting of the follower 83 under the influence of the helical spring which is interposed between the parts 37ª and 51ª is limited by the movement of the latter which is equal to the distance between the parts 45ª and 49ª at the left of the figure since when these come into contact when the helical spring expands, the part 51ª can move no further to the right. The normal elevation of the follower 83 after it leaves the outer cam 89, therefore, is such that it will readily pass into cooperation with the cam surface 85 to be depressed thereby and thereafter will move upwardly past the inner or left hand edge thereof. The bell crank 79 which carries the follower 83, however, can move away from the part 51ª against the force of keeper spring 81 and in consequence may be freely lifted in the reverse movement over the top of the cam 85 and a stationary cam is thus provided for. The cam surface 89 may be extended upwardly to any convenient degree so as to insure the engagement therewith of the follower on the return stroke independently of the action of the spring 81.

Having thus described in detail one specific embodiment of my invention shown by way of example in the accompany drawings, what I claim as new and desire to secure by Letters Patent I shall express in the following claims.

Claims—

1. In a loom of the class described, in combination, a guiding support, a reciprocating picking device carried thereby and adapted to draw the filling through the shed, said device having normally closed jaws, means for opening the same comprising a movable follower, a short fixed cam surface adjacent one end of the support to cooperate with said follower at the outer limit of its travel and a short fixed cam surface adjacent the other end of the support to cooperate with the follower adjacent the inner limit of its travel and past which it travels to move past the end of the same and return on the other side thereof.

2. In a loom of the class described, in combination, a guiding support, a reciprocating picking device carried by the support and adapted to draw filling through the shed, said device having filling engaging jaws, a spring pressed device for operating the jaws, a member for moving said device against the action of the spring but itself capable of moving away therefrom and including a follower, fixed diagonally arranged cams adjacent the ends of the support to cooperate with said follower adjacent it limits of travel, the follower passing by one cam and returning on the opposite side thereof, such action being permitted by the capability of motion referred to.

3. In a loom of the class described, in combination, a guiding support, a reciprocating picking device carried thereby and adapted to draw the filling through the shed, said device having normally open jaws, means for closing the same comprising a depressible follower, a guide extending along the support between the extreme lateral positions of said follower and terminating short of the position thereof at the inner limit of movement of said device and switch means at the outer end of the guide to shunt the follower at the end of the rearward movement of said device to a position to be depressed by the guide on the forward movement of said device.

4. In a loom of the class described, in

combination, a guiding support, a reciprocating picking device carried thereby and adapted to draw the filling through the shed, said device having normally open jaws, means for closing the same comprising a depressible follower, a longitudinally extending member providing inner and outer paths for said follower throughout the intermediate range of its movement with said device, a downwardly and outwardly sloping guide overlapping an end portion of said outer path and a barrier mounted at the end of the inner path and normally yieldably supported to slope therefrom to the guide.

5. In a loom of the class described, in combination, a guiding support, a reciprocating picking device carried thereby and having movable jaws to close on the filling, means for operating said jaws and a follower for actuating said means, an interior guide for the follower along the middle portion of the support, an exterior guide overlapping an end of the interior guide, a hinged extension for the interior guide and spring means to rock it upwardly to the adjacent portion of the exterior guide.

6. In a loom of the class described a reciprocating picking device having jaws closing to seize the filling and opening to release it and biased toward one position, means controlling the operation of the jaws including a follower moving with said device, a fixed track for moving the follower positioned to cooperate with the same between the extremes of its movement, a diagonally disposed cam surface across one end of the said track and a yieldable switch extending from the end of the track to said surface.

7. In a loom of the class described a reciprocating picking device adapted to carry filling through the shed in one phase of its movement and having grippers to engage the filling, means for operating the grippers comprising a follower moving with the device, a cam track positioned to cooperate with the follower between the extremes of its movement, a guide at one end of the track cooperating with the follower to shift it from one side of the track to the other and a barrier yieldable in one direction extending between the end of the track and the guide permitting the shifting of the follower in one direction only.

8. A picking device comprising a reciprocating member, a tube carried thereby, jaws at the end of the tube, a spring pressed rod received in the tube, which rod is hollow and provides a passage therethrough to receive the filling strand, said rod having a wedging portion cooperating with the jaws for operating the same and a lever for shifting the rod against the force of the spring.

9. In a loom of the class described a reciprocating needle at one side of the loom having a hollow body to receive the filling strand, jaws at an end of the body, operating means for the jaws whereby they are closed during protraction and open during retraction and cooperating means at the other side of the loom to take the filling from said needle.

10. A double needle loom comprising a protracting needle and a retracting needle; the former having grippers and means to operate the same comprising a follower moving with the needle, a cam track positioned to cooperate with the follower between the extremes of its movement, a guide at one end of the track cooperating with the follower to shift it from one side of the track to the other and a barrier yieldable in one direction extending between the end of the track and the guide permitting the shifting of the follower in one direction only; the latter needle having grippers governed to be open at the end of its inward and outward movements.

11. A double needle loom comprising a hollow protracting needle through which the filling may pass, a filling gripper carried thereby, means for opening the gripper at the extremes of movement of the needle and a retracting needle having a filling gripper and means whereby the gripper is opened and closed to receive the filling from that of the first needle.

12. A double needle loom comprising a hollow protracting needle through which the filling may pass, a filling gripper carried at the inner end thereof, means for operating the same comprising a sleeve embracing the filling and means at the outer end of the sleeve to move the same to open the gripper at the extremes of movement of the needle and a retracting needle having a filling gripper and means whereby the gripper is opened and closed to receive the filling from that of the first needle.

13. A needle loom comprising a protracting needle and means for reciprocating the same through the shed, said needle adapted to carry the end of the filling into the shed on its inward stroke and deliver the same to cooperating mechanism, said needle constructed to hold the filling in substantial alignment with its body portion, gripping means carried by the needle to clamp the filling and governing means for the gripping means to open the same at the inner extreme of movement of the needle and reclose the same only after outward movement has ceased.

14. A needle loom comprising a protracting needle and means for reciprocating the same through the shed, said needle adapted to carry the end of the filling into the shed on its inward stroke and deliver the same to cooperating mechanism, said needle constructed to hold the filling in substantial

alignment with its body portion, means to sever the filling at the inner end of the protracting needle as it completes its outward stroke, gripping means carried by the protracting needle to clamp the filling and governing means therefor to open the same at the inner extreme of movement and reclose the same after the filling has been severed and after outward movement of the needle has ceased.

In testimony whereof, I have signed my name to this specification.

GEORGE B. AMBLER.