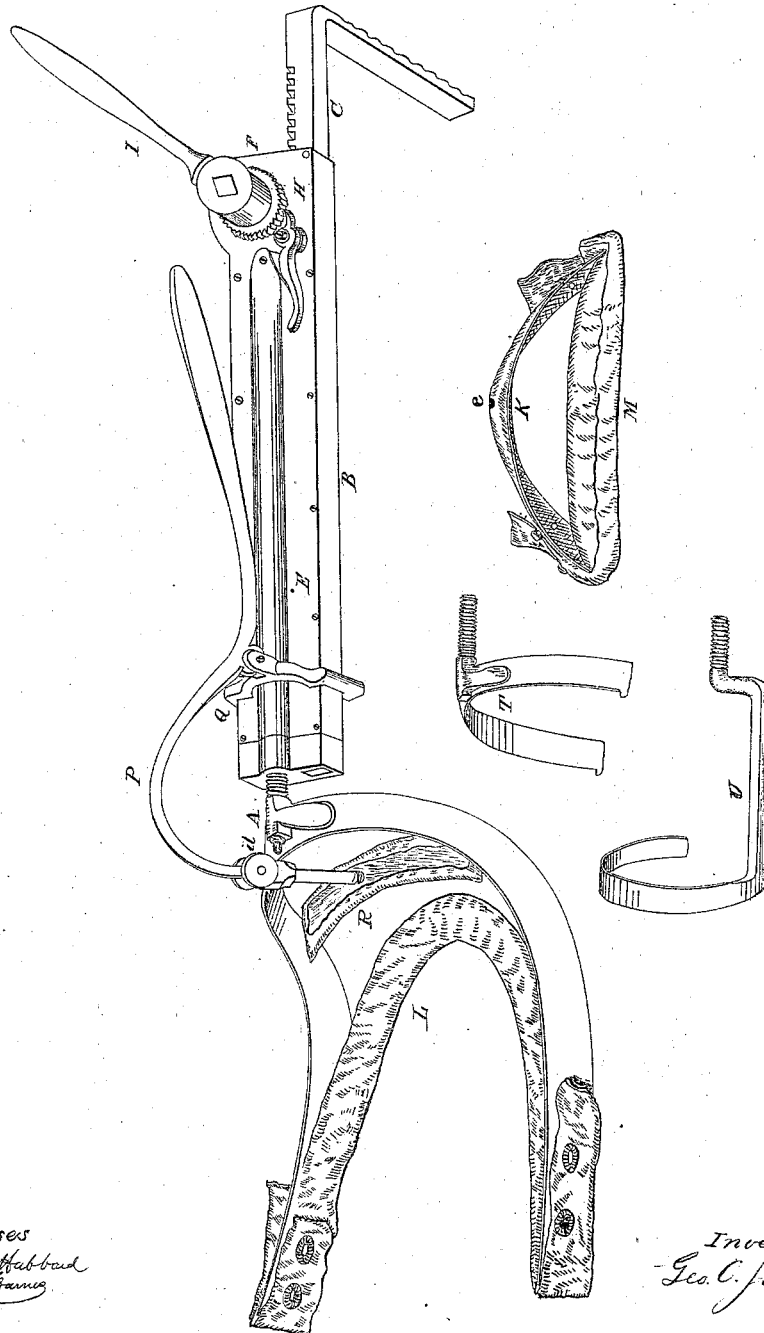


2 Sheets-Sheet 1.

G. O. Jarvis,
Fracture Apparatus.

N^o 2,263.

Patented Sep. 14, 1843.



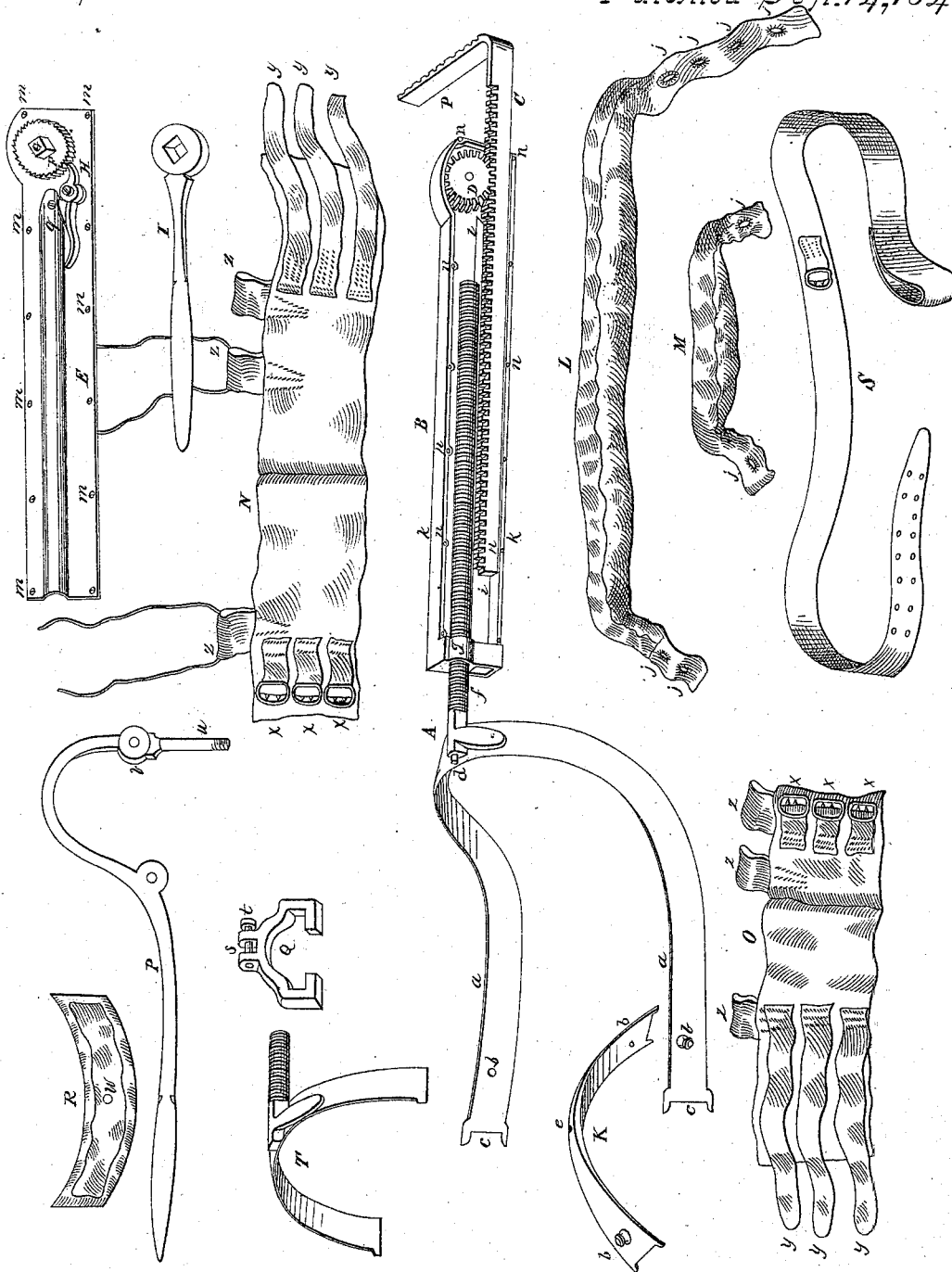
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G. O. Jarvis,
Fracture Apparatus.

No 3,263.

Patented Sep. 14, 1843.



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UNITED STATES PATENT OFFICE.

GEO. O. JARVIS, OF PORTLAND, CONNECTICUT.

APPARATUS FOR REDUCING DISLOCATIONS.

Specification of Letters Patent No. 3,263, dated September 14, 1843.

To all whom it may concern:

Be it known that I, GEORGE O. JARVIS, of Portland, in the county of Middlesex and State of Connecticut, have invented a new and useful machine or instrument for the purpose of producing the extension, counter-extension, and transverse or lateral motion necessary to reduce fractures and dislocations of bones and of maintaining a just coadaptation of the fractured ends of bones during the process of reunion; and that the following is a full and exact description of the same as invented or improved by me.

I denominate the said machine "the adjuster."

The drawings annexed to the subjoined specification are referred to therein and form a part thereof.

I. The first part of the machine may be called the case. Its form is shown in the drawing at B. It may be composed of any solid and strong material, such as wood, brass, iron, &c., but brass is supposed to be the best. It may be cast (if of brass) about one eighth of an inch thick and twelve inches long, the edges being turned at right angles with the plate about one fourth of an inch, as shown at *k, k*, leaving the case about one and one fourth of an inch wide except at one end where a pinion wheel is to be fitted and is marked D, in the drawing. The whole including the cap shown at E,—which is to be made fast to the case B, by screws at the screw-holes marked *m, m, m*, &c. in the cap, and *n, n, n*, &c. in the case—should be about half an inch thick, it being hollow within. This hollow is to be divided longitudinally by a partition marked *h*, cast lengthwise on the plate. Thus the edge of the case *k*, the partition marked *h*, the case B, and the cap E, form the four sides of the way for the rack C, to be hereafter described. The other edge of the case *k*, the partition *h*, the case B, and the cap E, form the way for the screw *f*, of the fork A, to be hereafter described.

On one end of the case terminating the way for the screw *f*, is to be cast a nut marked *g*, a screw hole to be made through it to receive the screw *f*, of the fork A. At the other end of the case and nearly in a line with the same way is to be placed a pinion wheel marked D, about one and one

fourth of an inch in diameter and one fourth of an inch thick with cogs to match, and so placed in the case as to fit accurately the cogs of the rack C, when passing in its way. The shaft marked G, of said pinion wheel, and which also serves as the shaft of the ratch-wheel marked F, is to bear on the cap E and the case B. On the outside of the cap E and directly over the pinion-wheel and fastened on the same shaft G is the ratch-wheel F about one and one fourth of an inch in diameter and three sixteenths of an inch thick. A catch or dog marked H is to be fitted to the ratches of the wheel F and fastened to the cap E by a pin with a spring marked *q*, operating to keep the catch applied to the ratches. The extremity of the shaft G terminates over the ratch-wheel by a hub or nut to be received into a corresponding hole in the end of the lever I. This lever may be about eight inches long and of a convenient size with a square hole in one end adapted to said hub G to be applied or removed at the pleasure of the operator.

II. The second part of the machine may be denominated the fork and is marked A in the drawing. It may be made of any firm metal, but steel is supposed to be the best. Its arms marked *a, a*, consist of a thin plate of such metal about three fourths of an inch wide and long enough to extend a little more than half around the upper part from the inside of the thigh, and at the same time each arm the one forward and the other backward rising by a gradual curve until the ends of the arms reach an imaginary transverse line crossing the upper part of the os ilium: said arms to stand at such a distance from each other as to sit loosely at all times to the part applied, and the ends of the arms terminating in a square notch marked C, C. A small flat button marked *b, b*, is firmly attached on the outside near the top of each of said arms. At the center between the two ends is to be firmly attached the shank or screw *f*, at one end and standing in nearly opposite directions to the arms *a, a*. It may be about ten inches long and three eighths of an inch in diameter, fitted to be received into the screw hole marked *g*, in the end of the case B, and intended to extend or contract the length of

the machine or instrument at pleasure, and to allow a free rotary motion to the case. From the top of the shank attached to the arms a small pin projects marked *d*, about one fourth of an inch long, on which may be placed at pleasure the curve K at a corresponding pin-hole at *e* in said curve now to be described.

III. The third part of the machine may be denominated the curve shown at K in the drawing. It may be made of any solid metal, but iron is supposed to be the best. It is to be in shape a curve rounded at its middle, and flattened at the ends to about one inch broad with a square notch in each end as at *c, c*. Its curve and length may be about as a segment two inches in diameter of a circle which is nine inches in diameter. Two small flat buttons marked *b, b*, are placed one near each end on and attached to its convex surface. A pin-hole marked *e*, is made in the center between the two ends to admit the pin marked *d*, projecting from the top of the screw *f*, of the fork A.

IV. The fourth part of the machine may be denominated the rack and is shown at C, in the drawing. It may be of any strong metal but steel is the best. It may be about half an inch wide and one-fourth of an inch thick and thirteen inches long to the angle marked *o*, in the drawing. On one edge are to be cut cogs to match accurately into the cogs of the pinion-wheel D. From the angle (which should be a right angle) to the other end marked *p*, may be about four and a half inches, and it should stand in an opposite direction to the hub of the shaft G when the rack C is in its way. This part of the rack marked *p*, may be denominated the foot of the rack, and forms the point of extension for the machine.

V. The fifth part of the machine may be denominated the transvecture, and consists of three separate parts shown at P, Q, and R, in the drawing. They may be of any solid metal, but iron is supposed to be the best. It consists first of a lever marked P about fourteen inches long of suitable strength and of convenient size and shape for the parts attached. A pin marked *u*, is attached by a hinge-joint marked *v*, to the end of the lever P. Said pin may be about one and a half inch long, and one-fourth of an inch in diameter terminating in a screw, which is intended to fasten into a screw-hole in the center of the femoral plate marked *w*. The said plate is shown at R, and may be about six inches long and one and a half inch wide and one-eighth of an inch thick, curved to fit the inside of the thigh. About two and a half inches from the hinge-joint on the lever P is to be attached by another joint the fulcrum marked Q. Said fulcrum is to be so fitted to the case B that it may slip on or off at pleas-

ure, and when on, that it may hold the transvecture firmly to the case B. The transvecture is intended to produce lateral or transverse motion at the option of the operator, by applying his own hand or that of an assistant to the lever P.

VI. The sixth part of the machine may be denominated the tibia-fork, and is shown at T in the drawing. It may be of the same material as the fork. It should have a short screw one and a half inch long or thereabouts, and be fastened at right angles with the arms, which should consist of a steel plate about half an inch wide and one-eighth of an inch thick in form of a half circle, the arms extending beyond the diameter of such circle about two inches in parallel lines and standing about six inches apart. The screw should be of the same size as screw *f*, and is intended to be inserted into the screw-hole *g*, instead of the screw *f*. The tibia fork is intended to be used instead of the fork in all fractures and dislocations occurring below the knee-joint, and when used it forms the point of counter-extension of the instrument.

VII. The seventh part of the machine may be denominated the brachi-fork and is shown on Plate II, at U. It may be made of the same material as the fork. It should consist of a screw about one and a half inch long of the same size as the screw *f*, of the fork A, terminating in a stem about three and a half inches long, and of any convenient size and shape; the extremity of the stem however to stand divergent from the time of the screw about one and a half inch. From the top or extremity of the stem and at a right angle with it, a curve is to commence and should form a little less than half of a circle, whose diameter is about four inches. This part also may be of any convenient size or shape, but round is the best shape. The brachi-fork is intended to be used instead of the fork or tibia-fork in most cases of fracture or dislocation occurring below the condyles of the os humeri. For such purposes it is to be inserted by its screw into the screw-hole *g*, of the case B, and when thus used it forms the counter-extending point of the instrument. When in use the case lies on the front of the forearm, the curve of the brachi-fork passing around on the back of the arm and close to the condyles at the elbow-joint.

VIII. The eighth part of the machine may be denominated the straps or rolls, of which there should be two, one for the fork A, and the other for the curve K. They may consist of leather, cloth, or any other strong and pliable material covered with some soft fabric such as velvet or canton flannel. They should be made hollow, and stuffed with some elastic substance (curled

hair being supposed to be best) leaving the ends of roll L free for some distance for a number of small button-holes to be made therein for the purpose of fastening to the buttons *b, b*; the said rolls being shown at L and M in the drawing. The roll at L for the fork A should be long enough to hang loosely down between the arms *a, a*, passing over the notches *c, c*, and fastening to the buttons *b, b*. The roll M for the curve K to stretch across the ends in the square notch and fasten by button holes to the buttons *b, b*. The foregoing rolls, when both are used, form the counter-extending point of the instrument, when the parts, to which they separately belong are also used.

IX. The ninth part of the machine may be denominated the belts, of which there should be two, shown at N and O in the drawing. The one at N should be fitted to clasp firmly the thigh close to and above the condyles of the os femoris, or the arm close to and above the os humeri. It may be found substantially described in Sir Charles Bell's Institutes of Surgery, article Dislocation, Philadelphia edition, 1840, page 114. The other belt represented at O may be made on the same principle, and should be made to fit the ankle above and close to the malleolus processes or the fore-arm at the wrist. The loops, which are shown at *z, z*, &c., may be of iron, cloth, or any strong material fastened firmly to the belts as represented in the drawing. Said loops are to be fastened to the foot *p*, of the rack C, by strong cords passing through the loops and over the foot *p*, and made fast thereto. The cords are shown at N passed through the loops *z, z*.

X. The tenth part of the machine is simply a strap of leather or cloth with a loop at one end to slip on to the arm of the fork at pleasure—a buckle made fast at the middle—with holes in the other end that it may be passed around the other arm of the fork and made fast in the buckle. The strap in use passes over the dorsum ilii and confines the arms of the fork outward. It is shown at S in the drawing.

The following is the mode of using the above described machine or instrument. It is believed that a description of its use in two dislocations, one of the hip-joint, the other of the elbow-joint, and in two fractures, one of the thigh-bone, the other of the leg-bones, will be a sufficient explanation for all who are acquainted with the science or practice of surgery.

1. *Dislocation of the thigh-bone upward and outward; the head of the bone and trochanter resting on the dorsum of the ilium.*—

Let the several parts of the instrument be combined as represented in Plate II. Let the belt N be buckled around so as to clasp the thigh firmly above and close to the con-

dyles of the thigh-bone, the loops of the belt standing toward the knee-joint, one being on either side of the limb, and strong cords passed through them. Now, let the roll L be applied closely in the angle between the perinæum and inside of the thigh; the arms of the fork, the one forward and the other backward, reaching nearly as high as the top of the os ilium. Fasten the strap S to the arms, crossing the dorsum of the os ilium so as to confine the arms outward. Fasten the loops by the cords already passed through them to the foot of the rack. Now let a common handkerchief or any thing convenient for that end be passed around the limb and instrument close to the knee, and made fast, to confine the instrument to the limb. Let the leg be bent at right angles with the thigh, and the thigh placed in a line with the body. Let an assistant, with one hand, take hold of the limb to be operated on, at the foot and, with the other hand, take hold of the knee. Another assistant having hold of the lever of the transvecture, let the operator now apply one of his hands to the lever I, and elongate the limb by moving the lever until with the other hand he feels the round head of the femur descend to a transverse line with the acetabulum. Now let the assistants, the one having hold of the lever P and the other of the limb simultaneously operate, the one by the lever casting the limb outward from the body, the other by throwing the foot inward and the knee outward, rotating the thigh on its own axis. The operator finds the head of the bone directly over the acetabulum, into which he restores the head of the bone (if need be) by gently pressing with the hand on the trochanter major, while extension in the limb is gradually relaxed.

2. *To reduce and treat in the bent position an oblique fracture of the thigh-bone (os femoris).*—Let the transvecture be removed from the case, and place the curve K on the pin *d*. Apply and fasten the instrument as before, except that the handkerchief, &c., be dispensed with. Now, place the limb with the instrument affixed on the double inclined plane with the necessary bandages upon it. Let the operator extend the limb by the lever as before until a just coaptation of the ends of the bones may be readily effected by him. Apply the proper splints, bandages, &c., agreeably to approved works on surgery, continuing such extension with the adjuster as shall preserve to the limb its due length and relieve it from any attending spasmodic contractions, and removing the instrument when no longer necessary for either purpose.

3. *To apply the instrument where the straight position of the limb is to be preserved:* It is only necessary to elongate the instrument by running out the screw of

the fork and the back from their ways sufficiently to adapt its length to the length of the whole limb; the point of extension being made fast by cords to the belt buckled around the ankle and from below the sole of the foot while the counter-extending point is applied as before to the angle between the perinæum and thigh. Two long splints, one long enough to reach from the perinæum to the sole of the foot, the other from the top of the os ilium to the sole of the foot, and each about two and a half inches wide and about one third of an inch thick, are to be folded in a cloth of cotton or flannel so as to form a casement or box for the limb to be laid in. The adjuster is to be applied and made fast after the limb is laid in the above casement or box. Now, let the operator extend the limb as before to effect coaptation. Let the adjuster, splints, and limb be now tied firmly together by passing two tapes, one above and the other below the knee for such purpose.

4. *To reduce and treat an oblique fracture of the leg where strong muscular contractions are required to be overcome to avoid either danger to the patient or deformity of the limb.*—Fasten by the buckle and straps attached the belt N immediately below the knee and around the leg. Fasten in like manner the belt O to the ankle as before. Let the fork A be removed from the case, and the tibia fork screw be inserted in its stead. Slip the arms of the tibia fork through the loops of the belt N. Fasten by strong cords the loops of the belt O to the foot of the back below the sole of the foot. Now, place the limb on the double inclined plane as before, the proper bandages being previously laid on the plane. Now, let the operator lengthen the limb to its due extent by throwing the rack out, the lever I operating on the shaft of the pinion wheel, and that again on the rack as before. Let the surgeon adjust the fractured bones, dress with splints, bandages, &c., as directed by approved works on surgery, maintaining such extension of the limb by the adjuster as shall be necessary to relieve undue muscular contraction, and preserve due length to the limb.

5. *To reduce a dislocation of the elbow-joint, where the coronoid process of the ulna lies in the posterior fossa of the humerus for the reception of the olecranon process of the ulna.*—Let the tibia fork be removed from the case, and the brachi-fork be inserted in its stead; the rack being so far run into its way as that the instrument shall be at least as long as the fore-arm and hand combined. Let the belt N be buckled around the arm close to the condyles of the humerus with the loops on the back of the arm close to and immediately above the olecranon process of the ulna. Let the

belt O be buckled around the wrist, the loops lying one on the front the other on the back of the wrist with strong cords in them. Now let the curve of the brachi-fork be passed through the loops of the belt N on the back of the arm. The case now lying on the front of the fore-arm, let the foot of the rack be closely fastened by the cords in the loops of the belt O to the wrist. Now, let the operator in the same manner as before so far throw the rack out by a gradual and steady motion as that the coronoid process of the ulna may ride over and lie in front of the pulley-like surface of the humerus, as the operator performs the necessary flexion of the fore-arm to bring the process into its place.

For the principles that should govern in the reduction of dislocations and fractures and the practice that should obtain in relation to position, splints, bandage, &c., reference is of course made to approved works on the principles and practice of surgery.

The invention herein before described is believed to differ from all others heretofore known or used in the application of three specific principles to the purposes above mentioned, and the invention is claimed to consist in the application of these principles, to wit: First, the application of the lever to produce extension, counter-extension, and lateral or transverse motion in reducing dislocations and fractures of bones; secondly, the application of the ratch-wheel and dog or catch to maintain such extension and counter-extension; thirdly, such an application of the screw and rack combined as that the instrument may be readily accommodated to any length or position of limb, and adapted to reduce any form of fracture or dislocation of any of the (so called) long bones and many others; indeed all, where the principle of extension and counter-extension apply in their reduction; and, fourthly, if is also claimed that the combination of various parts of the above described machine to produce the foregoing effect has been hitherto unknown in the art of surgery.

The lever may be applied to produce extension and counter-extension in several different ways; one only beside the one herein described will be named, to wit: by the lever operating on a shaft, on which coils a strap as of leather, cloth, or any strong and flexible material; the strap being attached to the end of a rod fitted to slide in a way, and which is thrown out of its way as the strap is coiled on its shaft; but, of the various methods the rack and pinion wheel herein described is supposed to be the best.

The ratch wheel and catch may also be variously applied. In addition to the mode herein described, the one just referred to, in which the lever may also be used, may be

equally adapted to the ratch wheel and catch; but the one herein described is supposed to be the best.

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

The application of the lever to the purposes above specified and the combination of the lever with the ratch-wheel and catch, and the screw and rack, in the manner here-

in before described and for the object set 10 forth.

Dated at Middletown, Conn. July 15th
A. D. 1843.

GEO. O. JARVIS.

In presence of—

LANGDON C. HUBBARD,
JONATHAN BARNES.