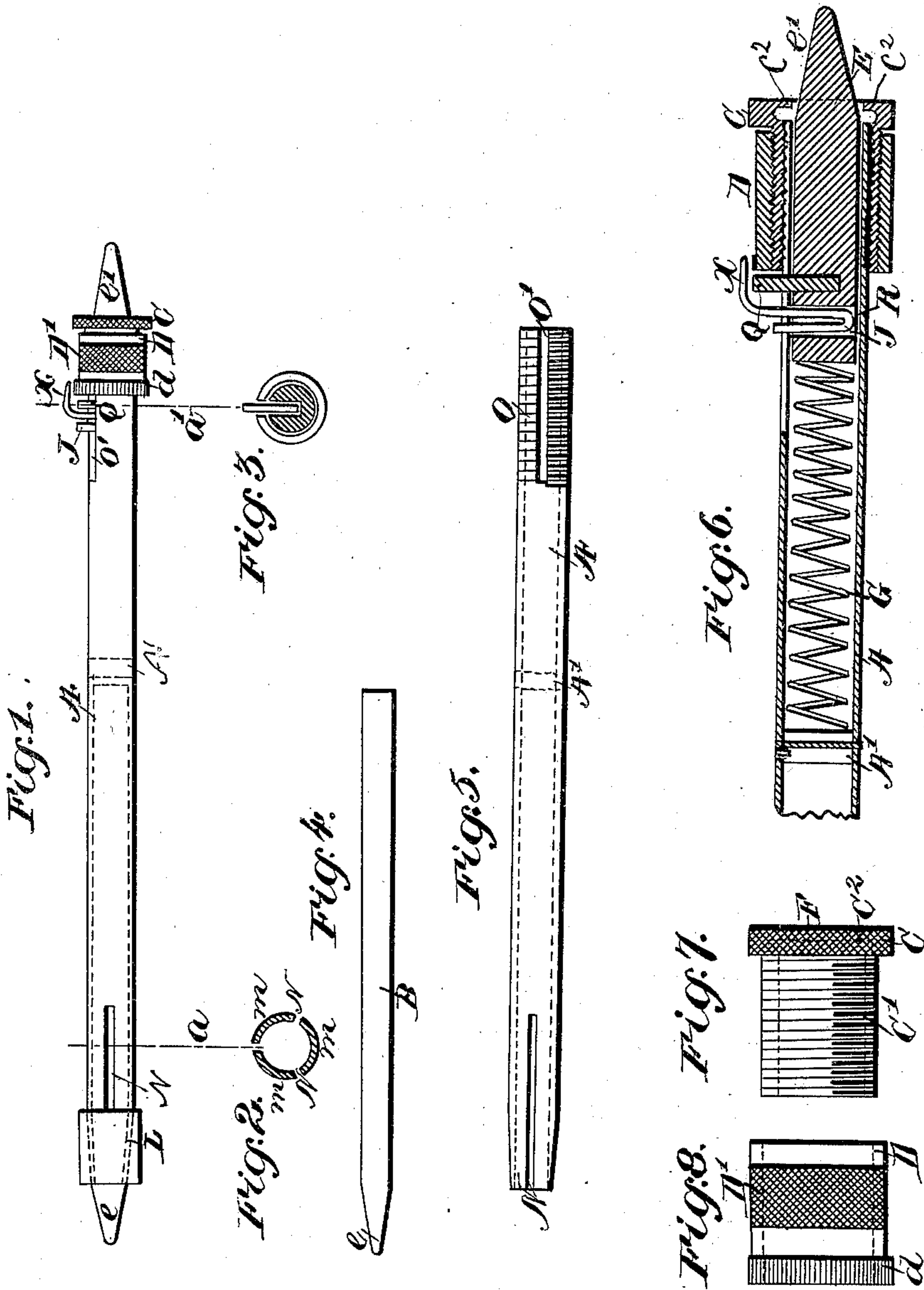


(No Model.)

H. C. BALSBAUGH.
SLIP AND SHRINKAGE GAGE.

No. 382,854.

Patented May 15, 1888.



Witnesses
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UNITED STATES PATENT OFFICE.

HENRY C. BALSBAUGH, OF HARRISBURG, PENNSYLVANIA.

SLIP AND SHRINKAGE GAGE.

SPECIFICATION forming part of Letters Patent No. 382,854, dated May 15, 1888.

Application filed May 21, 1887. Serial No. 239,028. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. BALSBAUGH, a citizen of the United States, residing at Harrisburg, in the county of Dauphin and State of Pennsylvania, have invented new and useful Improvements in Slip-Gages, of which the following is a specification.

My invention relates to machinists' tools for gaging the diameters of cylindrical bores, the interstices between walls or cavities, and for measuring increments of diameters necessary where round bodies are to be forced into bores under hydraulic pressure, or where they are to be shrunk upon each other. The instrument comprises a brass tube with slotted ends and transversely partitioned, one end being threadless and divided into three exteriorly-tapered tongues, and the other end being exteriorly threaded and formed with a longitudinal slot therein; a long round plug with terminal point, its body fitting snugly into said threadless end; an inwardly-flared ring adapted to ensleeve and compress said tongues, and when slipped inward thereon to clamp said plug therein; a corresponding short plug fitted into the tube's threaded end, it having a pin projected outward through said slot which it traverses; a spiral spring inserted in said end, between a partition in the tube and the inner end of the short plug; a tubular nut inserted on said threaded end of the tube and engaging said pin for adjusting the short plug and stopping it, the nut having an interior flange for being itself stopped thereby and jammed against the end of the tube; a micrometer nut or ring inserted on the exteriorly-threaded inner nut aforesaid; and a sprung indicator adjustably inserted in a receptacle in said short plug, reaching through said slot in rear of said pin, and having an index reaching over graduation-marks on said micrometer-nut for registering for the shrinkage beyond the caliper of the bore to be shrunk into, as will be hereinafter more fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a side view of my invention; Fig. 2, a cross-section of the tube made on the line *a*; Fig. 3, a cross-section of the instrument made on the line *a'*; Fig. 4, a side view of the pointed long-gage plug; Fig. 5, a side view of the tube or case; Fig. 6, a longitudi-

nal section of the instrument at the graduated end thereof; Fig. 7, a side view of the inner screw ring or nut; Fig. 8, a side view of the outer screw-ring or micrometer-nut.

In the description following similar reference-letters denote the same parts in all the views.

Letter A denotes the tube, preferably made of brass, having its wall exteriorly reduced or tapered at one end, and cleft by slots N into three or more tongues, *m*, over which is applied the slip-ring L, which is regularly flared to fit on and readily compress the said tongues when it is slipped up thereon. Into said end of the tube is inserted the round extensible plug B, formed with the terminal point *e* thereon. It may be adjusted nearly wholly into the tube before its butt-end comes against the partition-block A', rigidly fixed therein. It may be clamped quickly at any point of extension out of the tube by simply sliding the ring L inward on said tongues, it sticking in place where it becomes taut. The greater part of the gage adjustment is effected by said plug, tongues, and ring; but when the exact admeasurement is sought the similar short round plug E in the opposite end of said tube is used, it also having the terminal point *e'*. It is provided with the pin Q, which projects through the slot O' of the tube, and is engaged by the end of the nut C' when the latter is screwed onto the tube, as shown. Said plug is advanced as soon as said nut relieves it by the spiral spring G, which has its foot end set against the partition-block A', and has its opposite end exerted against said plug.

Upon the inner ring, C', which is threaded interiorly and exteriorly, is screwed the outer micrometer-nut, D, threaded interiorly, and having at its inner end the circle of graduation-marks *d* thereon, and it is milled at D'. In rear of the pin Q is the sprung pin J, whose returned body is inserted in the receptacle R in said plug. The returned point X of said pin, being extended outward over the pin Q, serves as the index to point at the particular mark selected in said circle *d*, the U-form body of the spring J being adapted to stand in said round hole R by the spring tension thereof. The said sprung pin is half-round stuff, that its doubled portion J may freely

traverse the slot O' and allow its point X to be turned a little to different marks of the circle *d*. The inner nut, C', is formed with the interior flange, C², against which the end of the tube A abuts for locking it. It has also thereon the milled boss C for working it, and against which the outer nut, D, may be abutted for locking it thereon.

For ordinary gaging the terminal points *e e'* are brought rightly distanced by adjusting the plug B, as set forth, and then the nut C' is operated to bring the point *e'* truly in place. This is the usual use or manner of adjusting the gage for gaging bores.

If now the diameter or caliber of a cylinder is known, the bore into which it may be forced under pressure or be brought by shrinking may be obtained as follows: The terminal points *e e'* of the gage may be set to correspond with the cylinder's diameter. Then, the nut C' being jammed or interlocked on the tube, the outer nut, D, is advanced to retract the plug E, to bring the point X over any desired mark of the circle *d* on it, taking care to set said point fairly over a mark the instant the outer nut impinges against the pin Q. With proper subdivision of said circle the graduation of the gage may be carried to thousandths of an inch.

I claim—

1. In a slip gage, the combination of the tube A, having one end threadless and formed with tongues *m*, having slots N between them, the long round plug B, having terminal *e* and sleeved snugly in said tube, the flared ring L, adapted to be slid inward on said tongues for clamping said plug therein, the corresponding shorter plug, E, having the terminal *e'* and pin Q inserted in the exteriorly-threaded end of said tube, with said pin projected through the slot O' therein, the spring G, contained in said threaded end and exerted against the inner end of the plug, and the nut C' on the threaded end of the tube and engaging said pin, substantially as and for the purposes set forth.

2. In a slip-gage, the combination, with the tube A, formed at one end with the taper

tongues *m*, duly spaced apart, and with the partition A' fixed therein, of the round plug B, sleeved in said tube and having the point *e*, of the slip-ring L, adapted to inclose said tongues and compress them onto said plug to hold it in place therein by sliding the ring over the tongues, of the plug E, provided with the pin Q, projecting through the slot O' in said tube, of the nut C', driven upon the threaded end O of said tube and having its inner end in contact with said pin, and of the spring G, interposed between said plug E and said partition in said tube, as and for the purposes set forth.

3. In a slip-gage, the combination, with the tube A, having one of its ends provided with the taper tongues *m*, the ring N, slipped thereon and with the long plug B adjustably held therein by said means, of the doubly-threaded ring or nut C', driven on the threaded end O of said tube, of the round plug E, provided with the fixed pin Q, projected through the slot O' and engaged by the inner end of said nut, of the spring G, inserted between the partition A' and the butt-end of said plug in said tube, and of the sprung pin J, provided with the point X, all arranged and adapted substantially as and for the purposes set forth.

4. In a slip-gage, the combination, with the tube A, having the long-pointed plug B adjustably clamped therein, and having sleeved in its opposite end the plug E, provided with the pin Q, of the ring or nut C', driven on said tube and jammed interiorly against the end thereof, of the outer nut, D, driven on said other nut and provided with the circle of graduation-marks *d*, of the spring G, supported in said tube and exerted to hold said pin in contact with said nuts, and of the sprung indicator J, inserted in the plug E and having its point X extended over said marks, so as to be adjustable to any of them, substantially as and for the purposes herein set forth.

HENRY C. BALSBAUGH.

Witnesses:

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