A. R. KING & J. DOUGHERTY.

Machine for Forming Screw-Threads in Sheet-Metal.

No. 210,784. Patented Dec. 10, 1878.

Fig. 1

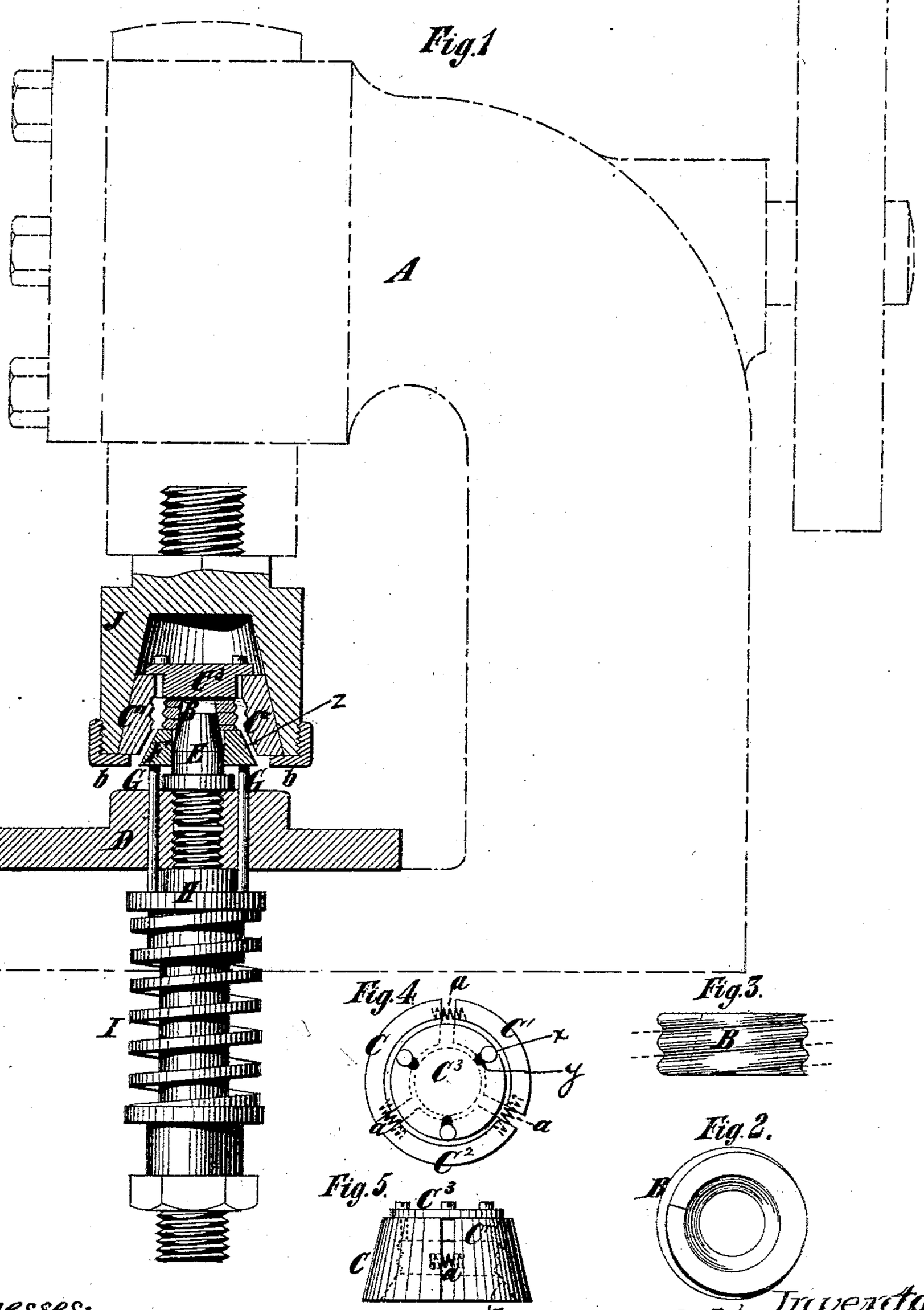

Fig. 4

Fig. 3.

Fig. 5.

Fig. 2.

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IMPROVEMENT IN MACHINES FOR FORMING SCREW-THREADS IN SHEET METAL.

Specification forming part of Letters Patent No. **210,784,** dated December 10, 1878; application filed August 13, 1877.

To all whom it may concern:

Be it known that we, ARTHUR R. KING and JAMES DOUGHERTY, both of the city of Brooklyn, in Kings county and State of New York, have invented certain Improvements in the Production of Screw-Threads, &c., in articles of Sheet Metal and other like material, of which the following is a description:

These improvements relate principally to the production of screw-threads upon sheet-metal caps and collars for oil-cans, lamps, jars, and other articles. They are embodied in machinery comprising male and female dies, which, after the article to be screw-threaded is properly presented to them, respectively enter and embrace the part to be screw-threaded, are afterward respectively expanded and contracted to stamp or press up the screw-thread, and are subsequently respectively contracted and expanded to release the article so screw-threaded.

In the accompanying drawing, Figure 1 represents a side view of a press delineated in dotted outline and a sectional side view of a pair of male and female dies and the appurtenances thereof embodying our invention, and especially adapted for producing screw-threads on screw-caps for sheet-metal cans, such as are commonly used for oil. Fig. 2 is a plan or top view of the male die. Fig. 3 is a side view thereof. Fig. 4 is a plan or top view of the female die, and Fig. 5 is a side view thereof.

Similar letters of reference designate corresponding parts in all the figures.

The press A has been shown in dotted outline, because of itself it forms no part of our invention, and may be of any suitable form. B and C, C^1, C^2, and C^3, respectively, designate male and female dies combined with the press A for producing screw-threads in the manner before described. The male die, B, is here shown as made of a continuous strip of spring or suitable elastic metal formed into spiral coils preferably bearing snugly one against another.

The outer circumference or exterior of the coils of the mail die are shaped correspondingly to the screw-thread desired to be produced, and the inner circumference or interior of the said die is such that a conical opening is formed within the die. The die thus constructed may be expanded at pleasure by any suitable conically-tapering object acting as a wedge in its conically-contracted interior, and when freed from said object will contract to its normal dimensions.

The female die is shown as consisting of a series of segmental-like sections, C C^1 C^2, united by a cap-piece, C^3, in any suitable manner, by screws *x* passing through radial slots *y* in said cap-piece, and held apart when not otherwise acted upon by suitable means, such as spiral springs *a*. A portion of the interior of this die C C^1 C^2 C^3 corresponding to the length of the male die, B, is of cylindrical form and grooved spirally in a manner corresponding to said male die, and below this portion is an outwardly-flaring portion, *z*, adapted to accommodate a petticoat or flange on the screw cap, collar, or other device to be screw-threaded. The exterior of this female die is of conical or tapering form.

It will be understood that if an internally-conical or tapering device is forced over this die its sections C C^1 C^2 will be forced together, and that if the said internally conical or tapering device is made to release the die its sections C C^1 C^2 will be forced apart by the springs *a*.

D designates a bed-plate, which may be affixed to the bed of the press A in any suitable manner. E designates a mandrel, which is shown as affixed to this bed-plate D, and has a tapering tip, on which fits the internally-tapering male die, B, previously described. F is a yielding support and push-piece or follower, of annular form, surrounding the mandrel E and acting on the male die, B. It is externally of tapering form, to accommodate between it and the flaring portion of the female die, C C^1 C^2 C^3, the petticoat or flange of a screw cap or collar to be screw-threaded. G designates rods extending from the yielding support or push-piece to a follower, H, against which impinges a spring, I.

J designates a head or chuck carried by the plunger of the press A. It is internally tapered, contains the externally-tapered female die, C C^1 C^2 C^3, and is provided at the bottom with an inwardly-extending flange, *b*, by which the said female die is retained within it. The

cap or collar to be screw-threaded is placed over the male die, B, and in descending the plunger of the press brings the cap-piece C^3 of the female die down upon said cap or collar. The plunger of the press descending still farther forces its internally-tapering head J over the taper exterior of the female die and forces its sections together, so that they embrace and press upon the exterior of the said cap or collar to be screw-threaded, and, through the medium of the cap-piece C^3 of the female die, the plunger forces the male die, B, along the taper tip of the mandrel E, (the support F yielding to permit this,) causing said male die to press against the interior of the said cap or collar, so that with the aid of the female die the screw-thread is produced. Afterward the plunger ascends, its head releases the female die, the sections C C^1 C^2 of the latter are forced apart, so as to clear the screw-thread on the said cap or collar in ascending with the plunger-head, the spring I forces up the push-piece and support, releases the male die from the mandrel E, allowing it to contract so as to clear the screw-thread of the said cap or collar, and permitting the removal of the latter readily and expeditiously by merely picking it up.

Although we have shown the male die near the bed-plate of the press and the female die carried by the plunger of the press, they may be reversed, and possibly with advantage, for some work. Desirable as we deem the male die, B, because of its continuous character, yet we may use a male die of sectional form similar in style to the female die—for instance, a die composed of sections provided externally with spiral grooves, capable of being expanded by a tapering device operating within it, and adapted to contract automatically when relieved from the operation of the said tapering device. Indeed, we may with advantage avail ourselves of hydraulic pressure in lieu of a male die for forcing the article to be screw-threaded out into the female die, and if this is done we may produce various irregular forms according to our invention—such, for instance, as sheet-metal ornamental finials and like articles. Though in our description of our invention we have only mentioned its applicability to sheet-metal articles, it may prove applicable to the production of screw-threads and irregular configurations upon various other materials capable of being shaped by pressure.

By our invention we are enabled to produce screw-threads upon sheet-metal caps, collars, &c., for cans, lamps, and other articles more expeditiously, and, consequently, at lower rates, than they can be produced by the old process of spinning them upon a mandrel; and, moreover, we can in this way produce more perfect screw-threads than can be spun on a mandrel, because the pressure necessary to form the threads is exerted at all points simultaneously and uniformly, whereas in spinning upon a mandrel, when the spinning-tool, after forming part of a screw-thread, acts upon another part, it is apt to draw out, or in a measure flatten out, the part first formed by its draw on the article, and will thus impair the quality of the thread by destroying its uniformity.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination of a contractible internally screw-threaded female die and an expansible externally screw-threaded male die, substantially as and for the purpose set forth.

2. A male die consisting of a piece of metal coiled and shaped externally so that it may form a screw-thread, substantially as and for the purpose specified.

3. The combination, with a sectional die capable of being contracted by the operation of the plunger-head of a press, and provided with a cap-piece, of a male die formed of coiled spring metal and a taper mandrel, on which said male die fits, and whereby said male die may be expanded when forced over the same by the cap-piece of the female die, substantially as and for the purpose specified.

4. The combination, with an internally-tapered expansible male die, of a taper mandrel receiving said male die upon it, and a support for said die sustained by a spring adapted to yield to permit the said die to be forced over the said mandrel, and afterward to serve as a push-piece to release the die from the mandrel, substantially as specified.

5. The combination of the female die, C C^1 C^2 C^3, plunger-head J, male die, B, mandrel E, yielding support and push-piece F, and spring I, substantially as and for the purpose specified.

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