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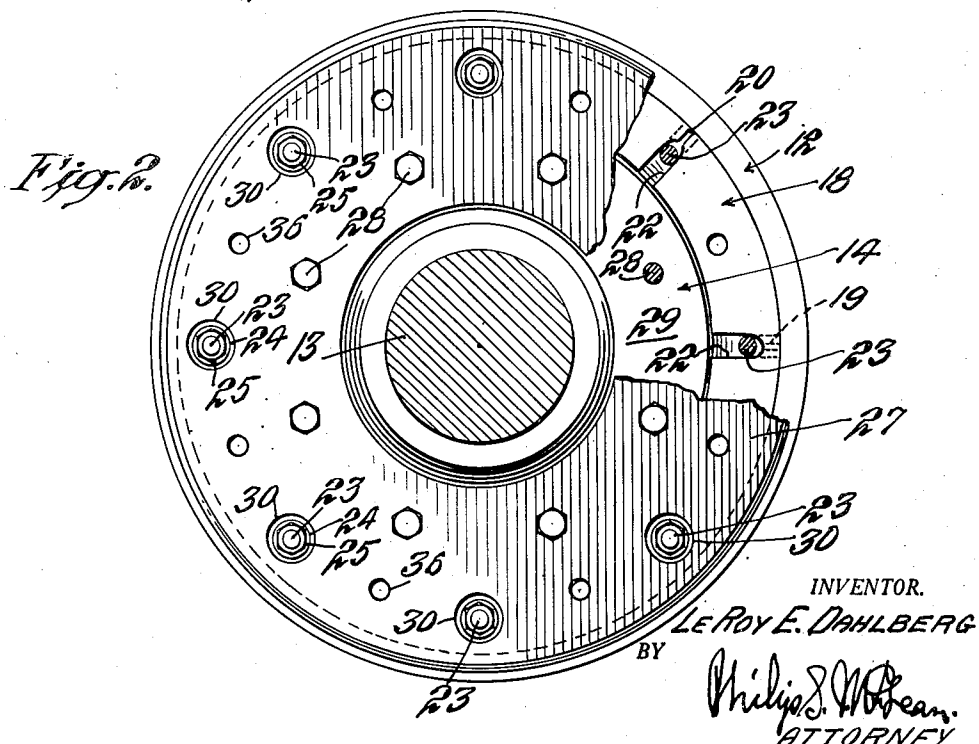
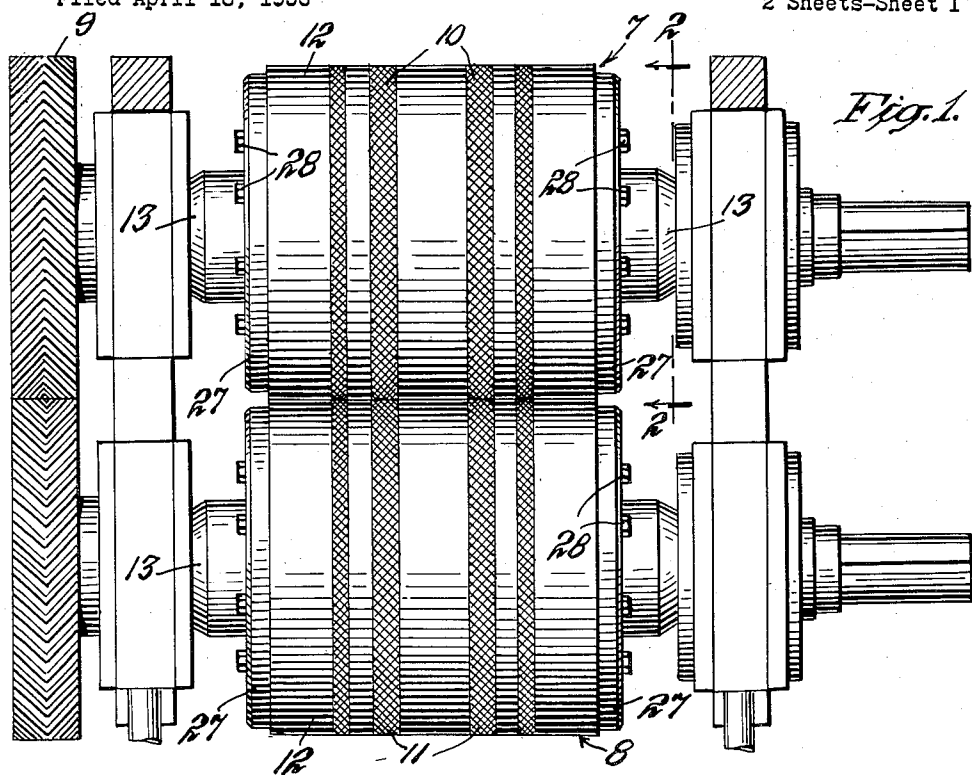
L. E. DAHLBERG

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EMBOSSING ROLLS

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2 Sheets-Sheet 1



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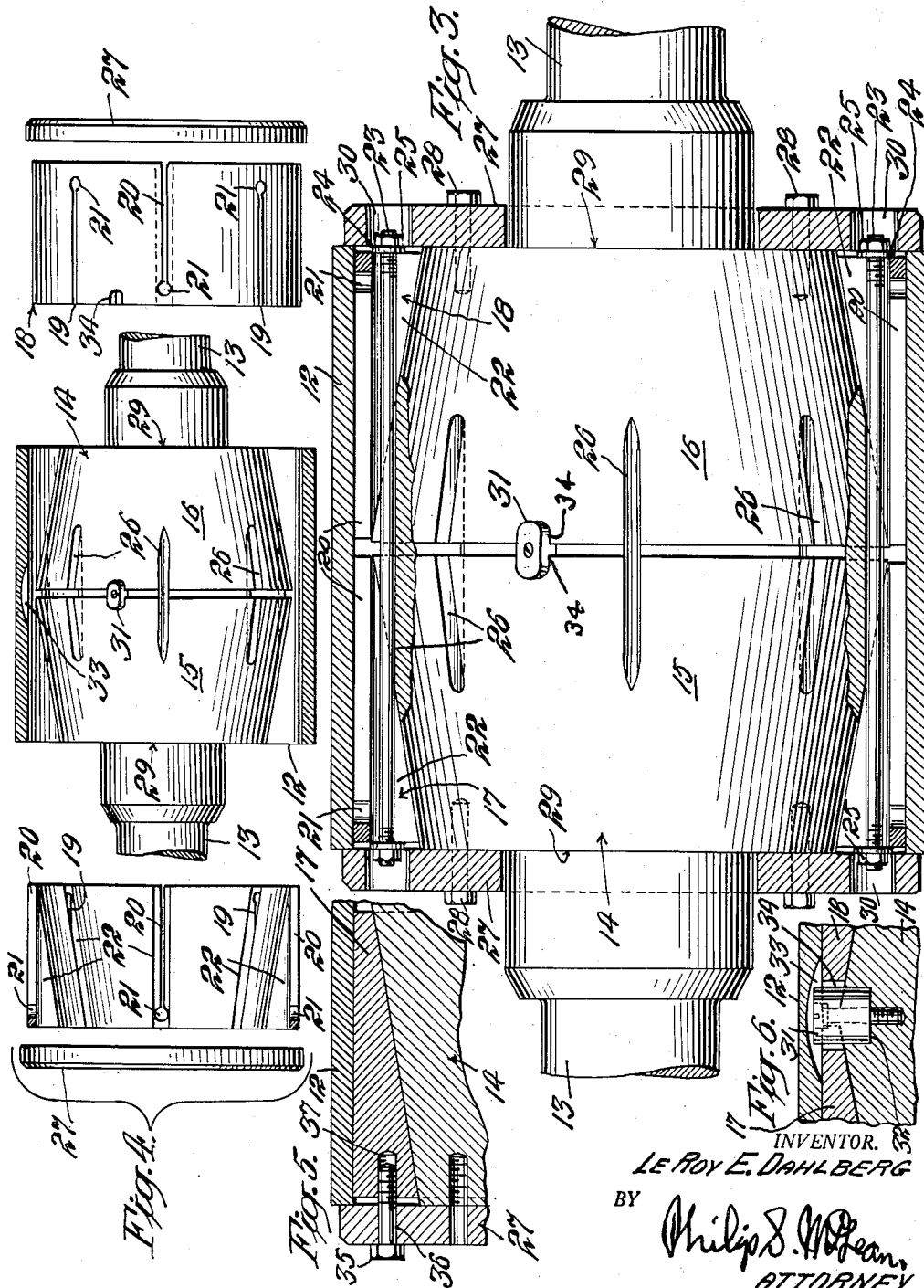
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EMBOSSING ROLLS

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Application April 18, 1956, Serial No. 579,029

10 Claims. (Cl. 101—375)

The invention here disclosed relates to sheet metal embossing rolls of the kind disclosed in copending patent application Serial No. 369,872, filed July 23, 1953, in which the dies are in the form of hardened metal rings or sleeves mounted on solid shaft cores. It is essential in such constructions that the die rings, which are relatively thin shells, be solidly supported on the mounting cores.

In the copending patent application identified this was effected by slitting the die shell longitudinally and applying contracting force to the ends of the split shell to shrink it down solidly on the core.

With these split dies there is naturally a tendency to leave an impression at the line of break, even though the gap for all practical purposes be fully closed in shrinking the shell down on the core. For that reason it has become the usual practice to feed the presses equipped with such rolls with stock cut to a length less than the full circumference of the roll.

Objects of the present invention are to obtain the advantages of an unbroken circumferentially continuous die, in the shell or sleeve form indicated, with solid mounting on the shaft core, such construction having all the advantageous features of the separable shell die roll with the further advantage of continuous feed operations without marking the stock.

Special objects of the invention are to provide this new continuous die shell roll in a simple, practical and low cost form of construction.

Further special objects are to provide means for positively securing and for positively releasing the die sleeves, which can be quickly and conveniently operated as required.

Other desirable objects and further novel features through which the purposes of the invention are attained are set forth and will appear more fully in the course of the following specification.

The drawings accompanying and forming part of the specification are illustrative of the present commercial embodiment of the invention. Structure, however, may be modified and changed as regards the immediate illustration, all within the true intent and scope of the invention as hereinafter defined and claimed.

Fig. 1 in the drawings is a part sectional front elevation of a pair of the matched die rolls constituting the active members of an embossing press;

Fig. 2 is an enlarged broken and part sectional end elevation of one of the rolls taken on substantially the plane of line 2—2 of Fig. 1;

Fig. 3 is a broken longitudinal sectional view showing the parts in assembled relation with the tie rods set up to pull the wedge rings into holding engagement with the surrounding die shell;

Fig. 4 is an exploded view showing the parts separated;

Fig. 5 is a fragmentary sectional view illustrating use of the special bolts for pulling the wedge rings loose from the surrounding die sleeve;

Fig. 6 is a fragmentary sectional detail of the radial

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key structure for circumferentially locating the die shell and wedge rings on the core.

In Fig. 1 the companion rolls of a matched die set are indicated at 7 and 8, geared together at 9 and carrying intermeshing or corresponding positive and negative die elements 10 and 11.

These companion die elements are surface portions of sleeves, bands or rings 12 in the form of thin, cylindrical, hardened steel shells and the die formations may be produced by the photoetching method disclosed in copending patent application above identified, by engraving or other appropriate methods.

These thin die shells, as more fully pointed out in the copending application, have many advantages. In particular, they can be hardened uniformly and all the way through and they can be light enough for handling by one man.

A particular feature of the present invention is that the die shells or sleeves are circumferentially complete and therefore provide a continuous, unbroken die surface which can be utilized for continuous die rolling operations.

This feature is indicated in Fig. 2, which shows the die shell 12 as an unbroken cylindrical member.

Fig. 3 shows how this continuous cylindrical element is backed up in solidly mounted relation on the roll shaft 13.

The mounting structure comprises a core or mandrel 14, usually made as an integral part of the shafting and having reversely tapered, conical shoulders 15, 16, inclined from the mid-portion toward opposite ends of the core for supporting similarly inclined expansible tapered wedge rings 17, 18 which directly support the surrounding sleeve.

The tapered wedge rings are made expansible to parallel effect by slitting them longitudinally inwardly from opposite ends, that is, with slots 19 extending from the inner, thinner ends and reverse slots 20 extending alternately inward from the outer, thicker ends, as indicated in Fig. 4.

These slots are shown in Fig. 4 as terminating short of the far ends of the wedges in circular through openings 21, providing flexibility for desired hinging action between the connected wedge segments.

At the inner, inclined face of the wedges grooves 22 are provided in line with but wider than the slots and extending the full length of the wedges to accommodate tie rods 23, Fig. 3, which at their outer ends carry washers 24 in engagement with the outer ends of the wedges and nuts 25 for adjusting the wedges toward each other and for securing them in adjusted relation.

Clearance for these tie rods at the central, high portion of the core is provided by grooves 26 in line with the grooves in the wedges.

The die sleeve is centered longitudinally on the core by end plates or flanges 27 secured by bolts 28 to the radial positioning shoulders 29 at the opposite ends of the core.

These end plates which position the die sleeve longitudinally on the core, are shown as having large size openings 30 in line with and providing access to the adjusting nuts and washers of the tie rods or tie bolts, thus to enable adjustment of these parts independently and apart from the end plates which are fixedly secured to the ends of the core.

The die sleeve and wedges are keyed radially to the core by a radially extending key block 31 secured in a recess 32 in the core, in position to enter a keyway 33 in the sleeve and to extend through notches 34 in the inner ends of the wedges.

The incline of the supporting shoulders and wedges may

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be relatively slight, short of seizing, and this together with the fact that the parts are practically all contained within the sleeve, makes it desirable to have some readily accessible means for positively releasing and loosening the wedges.

Such means are present in the illustrated construction in the form of bolts 35, Fig. 5, which can be inserted through extra openings 36 in the end plates, into engagement with screw seats 37 provided in the outer ends of the wedge rings.

Since these extracting or wedge loosening bolts 35 are only required when the wedge rings are to be loosened, they may ordinarily be left off the roll and be inserted through the openings 36 only when needed.

As will be seen from Fig. 4, the parts can be quickly and easily assembled. The die sleeve may first be located in engagement over the key on the core and then the wedge rings be slipped into position over the sloping shoulders of the core with the notches in the inner edges of the rings engaged with the key. After this the end plates may be bolted in position over the ends of the core, these, in so doing, locating and centering the sleeve longitudinally of the core. After this the tie rods, if not already in position, may be passed through the larger openings in the end plates and the washers and nuts applied to the ends of the rods and adjusted to expand the wedges into firm holding engagement with the shell.

Thus assembled, the die shell is locked longitudinally and transversely and held in solid metal-to-metal engagement on the core.

If at any time it becomes necessary to remove the die shell, this can be quickly accomplished by loosening the tie rods and inserting the extraction bolts and turning them in to pull the wedges outward, out of gripping engagement with the core and die shell. After thus loosening the wedges the end plates may be removed, this then providing full access for removing wedge rings and die sleeve.

The construction disclosed, with holding and supporting of the die shell from the interior, enables utilization of the full length of the die and hence a wider pattern and the working of wider stock than was possible with exteriorly held dies. The expansion wedges support the circumferentially continuous die shells so uniformly that maximum pressure required may be safely used in the embossing operation and the shells may be made lighter and thinner than heretofore considered practical.

The interfitting and interlocking relation of the parts aids assembly and assures only proper and accurate placing and engagement of the cooperating elements. The radial key 31 locates the die shell in proper circumferential position on the core and the wedge rings in position with the grooves in their inner surfaces in line with the grooves in the core, ready to receive the tie rods. In this partial assembly the tie rods will be held in place at the outside by the surrounding wedge rings and at the inside by the centrally grooved portions of the core. In the completed assembly these grooves in the core may support the tie rods to such an extent as to prevent them, when loosened, from working inward out of the grooves in the wedge rings.

What is claimed is:

1. Embossing roll comprising a central core having conical supporting shoulders tapered from a mid-length diameter toward opposite ends of the core and having radially extending positioning shoulders at said opposite ends, a circumferentially continuous, thin die shell surrounding said core, end plates at said positioning shoulders and extending radially outward into position for engagement with and for holding said die shell in longitudinally centered relation over the core, means adjustably securing said end plates to said positioning shoulders reversely inclined radially expandible wedge rings engaged over said conical supporting shoulders within said die shell and

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means for drawing said expandible wedge rings toward each other to effect expansion of the same into supporting engagement with the surrounding die shell.

2. Embossing roll comprising a central core having conical supporting shoulders tapered from a mid-length diameter toward opposite ends of the core and having radially extending positioning shoulders at said opposite ends, a circumferentially continuous, thin die shell surrounding said core, end plates at said positioning shoulders and extending radially outward into position for engagement with and for holding said die shell in longitudinally centered relation over the core, means adjustably securing said end plates to said positioning shoulders reversely inclined radially expandible wedge rings engaged over said conical supporting shoulders within said die shell and means for drawing said expandible wedge rings toward each other to effect expansion of the same into supporting engagement with the surrounding die shell and including tie rods extending through said wedge rings and having thrust applying adjusting means on the outer ends of the same and said end plates having openings exposing and providing free access to said adjusting means.

3. Embossing roll comprising a central core having conical supporting shoulders tapered from a mid-length diameter toward opposite ends of the core and having radially extending positioning shoulders at said opposite ends, a circumferentially continuous, thin die shell surrounding said core, end plates at said positioning shoulders and extending radially outward into position for engagement with and for holding said die shell in longitudinally centered relation over the core, means adjustably securing said end plates to said positioning shoulders reversely inclined radially expandible wedge rings engaged over said conical supporting shoulders within said die shell and means for drawing said expandible wedge rings toward each other to effect expansion of the same into supporting engagement with the surrounding die shell, including tie rods, the wedge rings having longitudinal grooves in the inner faces of the same and said tie rods extending through said grooves, abutment washers on the outer ends of the tie rods over the outer ends of said grooves in engagement with the outer ends of the wedge rings about said grooves and nuts on the ends of the tie rods in engagement with said abutment washers.

4. Embossing roll comprising a central core having conical supporting shoulders tapered from a mid-length diameter toward opposite ends of the core and having radially extending positioning shoulders at said opposite ends, a circumferentially continuous, thin die shell surrounding said core, end plates secured to said positioning shoulders and holding said die shell in longitudinally centered relation over the core, reversely inclined expandible wedge rings engaged over said conical supporting shoulders within said die shell and means for drawing said wedge rings toward each other to effect expansion of the same into supporting engagement with the surrounding die shell, a radial key on the mid-portion of the core, the die shell having a keyway receiving said key and the inner edges of the wedge ring having notches engaged about said key.

5. Embossing roll comprising a central core having conical supporting shoulders tapered from a mid-length diameter toward opposite ends of the core and having radially extending positioning shoulders at said opposite ends, a circumferentially continuous, thin die shell surrounding said core, end plates secured to said positioning shoulders and holding said die shell in longitudinally centered relation over the core, reversely inclined expandible wedge rings engaged over said conical supporting shoulders within said die shell and means for drawing said wedge rings toward each other to effect expansion of the same into supporting engagement with the surrounding die shell, including tie rods, the larger diameter, mid-portion of the core having longitudinal grooves receiving said tie rods and the wedge rings having grooves in the inner faces of the same receiving said tie rods and nut

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elements on the outer ends of the tie rods in thrust applying relation to the outer ends of the wedge rings.

6. Embossing roll comprising a central core having conical supporting shoulders tapered from a mid-length diameter toward opposite ends of the core and having 5 radially extending positioning shoulders at said opposite ends, a circumferentially continuous, thin die shell surrounding said core, end plates at said positioning shoulders and extending radially outward into position for engagement with and for holding said die shell in longitudinally centered relation over the core, means adjustably 10 securing said end plates to said positioning shoulders reversely inclined radially expansible wedge rings engaged over said conical supporting shoulders within said die shell and means for drawing said expansible wedge rings toward each other to effect expansion of the same into supporting engagement with the surrounding die shell, including screw bolts connecting the wedge rings and said 15 end plates having openings exposing the outer ends of said screw bolts.

7. Embossing roll comprising a central core having conical supporting shoulders tapered from a mid-length diameter toward opposite ends of the core, a circumferentially continuous die shell surrounding said core, reversely inclined expansible wedge rings engaged over said 20 conical supporting shoulders within the die shell, means for forcing said wedge rings toward each other to effect expansion of the same into supporting engagement with the surrounding die shell, means for positioning said die shell longitudinally over the core independently of said adjustment of said wedge rings, including end plates in engagement with opposite ends of said shell and means 25 for adjustably securing said end plates to opposite end portions of said central core; and means independent of both the wedge ring adjustment and the longitudinal positioning of the die shell for effecting relative separating 30 movement of said wedge rings to release the same from supporting engagement with the die shell, including bolts in thrust applying engagement with said end plates and extending through said end plates into engagement with 35 said wedge rings.

8. Embossing roll comprising a central core having conical supporting shoulders tapered from a mid-length diameter toward opposite ends of the core, a circumferentially continuous die shell surrounding said core, reversely inclined expansible wedge rings engaged over said 40 conical supporting shoulders within the die shell, means

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for forcing said wedge rings toward each other to effect expansion of the same into supporting engagement with the surrounding die shell, means for positioning said die shell longitudinally over the core independently of said 5 adjustment of said wedge rings and keying means on the core in positioning engagement with said wedge rings and with the surrounding die shell.

9. Embossing roll comprising a central core having conical supporting shoulders tapered from a mid-length diameter toward opposite ends of the core, a circumferentially continuous die shell surrounding said core, reversely inclined radially expansible wedge rings slotted 10 inwardly from opposite ends engaged over said conical supporting shoulders within the die shell, said wedge rings having longitudinally extending grooves within and extending continuously from end to end of the same in line with and in communication with said slots in the rings and the mid-length portion of the core having grooves in 15 line with said wedge ring grooves and tie rods disposed in said aligned grooves and carrying abutments in clamping engagement with the outer ends of the wedge rings. 20

10. Embossing roll comprising a central core having conical supporting shoulders tapered from a mid-length diameter toward opposite ends of the core, a circumferentially continuous die shell surrounding said core, reversely inclined expansible wedge rings engaged over said 25 conical supporting shoulders within the die shell, said wedge rings having part length extending longitudinal slots in the outer portions and aligned full length grooves in the inner portions of the same in line with and in communication with said longitudinal slots and tie rods extending through said grooves and carrying clamping abutments engaged with the outer ends of the wedge rings. 30

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