April 11, 1961 A. R. LANG 2,978,978

SPRING CONSTRUCTION FOR A TYPE RACK

Filed Aug. 31, 1959

Fig. 1.

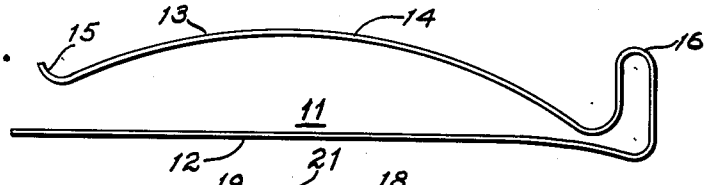


Fig. 2.

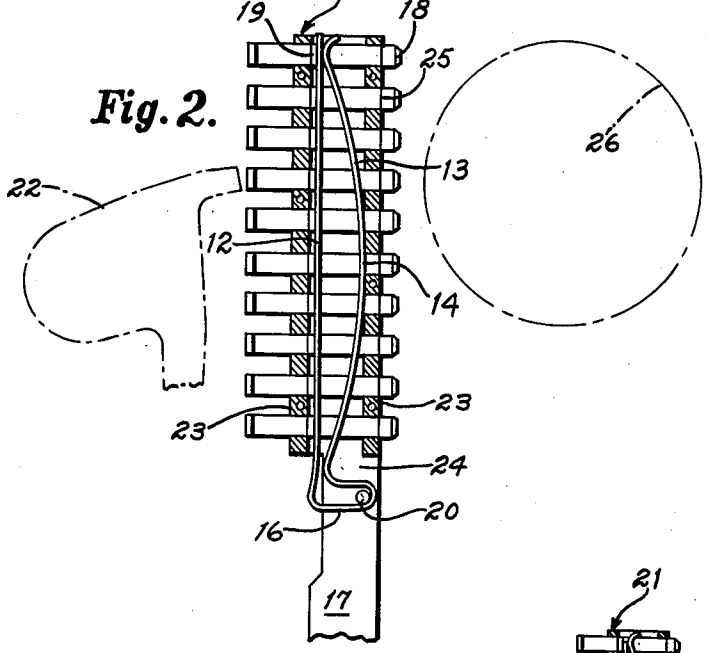


Fig. 3.

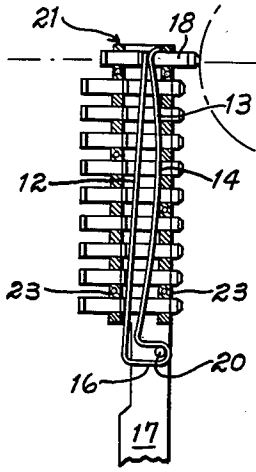


Fig. 4.

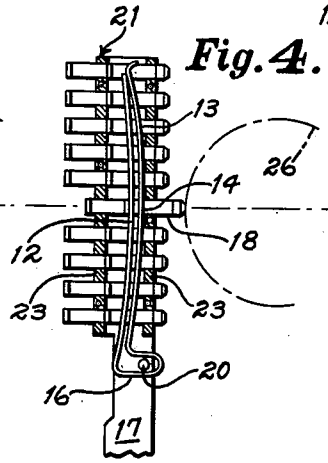
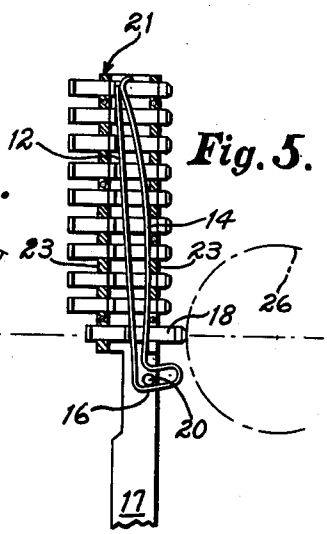


Fig. 5.



INVENTOR.
ANDREW R. LANG
BY Harry R. Dumont
ATTORNEY.

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SPRING CONSTRUCTION FOR A TYPE RACK

Andrew R. Lang, Detroit, Mich., assignor to Burroughs Corporation, Detroit, Mich., a corporation of Michigan

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6 Claims. (Cl. 101—109)

This invention relates to printing mechanisms and has particular reference to a biasing spring for printing elements in a type rack or magazine.

One object is to provide a spring construction for apparatus of the above and a related character which permits a very limited amount of spring vibration.

Another object is to provide a spring construction which permits deformation of the impacted portion of the spring within substantially the full width of the housing.

Another object is to provide a self adjusting spring which will by its own action vary the impact points and thus increase the impact area for each type element or the like greatly decreasing the possibility of fracture at these points.

A further object is to provide a spring construction and mounting so designed that the spring is retained within its housing but is not limited in its deflection within the limits of the housing.

The above and other objects will appear more clearly from the following detailed description and drawings which illustrate a preferred embodiment of the inventive idea in which:

Fig. 1 illustrates the shape of the spring prior to its insertion in the type rack of Fig. 2;

Fig. 2 is a vertical longitudinal section of the type rack with its associated elements in their assembled positions;

Figs. 3, 4, and 5 illustrate the action of the spring in the type rack of Fig. 2.

Referring to the drawings, Fig. 1 shows spring **11** which is of unitary construction, formed from a single strip of resilient material into a spring of substantially hairpin configuration. One leg portion **12** of the hairpin shaped spring is substantially straight and the other leg portion **13** is bowed with an arcuately bent central fulcrum section **14** about which the spring can rock freely when in its mounted position. When placed under slight compression for mounting in the assembly the straight leg **12** is in opposition to bowed leg **13** near its terminal portion **15**. In addition, there is a bent stud retaining loop portion **16** formed at the base of the U-shaped structure. The design of spring **11** incorporates bend radii of a maximum size throughout legs **12** and **13**, to provide reduced stress on the spring when flexure occurs. Where the leg portions **12** and **13** join the loop portion **16** the bends are not less than substantially right angle bends.

In Fig. 2 is shown the application of the spring of the present invention to a type rack **12**, which is illustrated in Figs. 67 and 69 of U.S. Patent 2,629,549, issued on February 24, 1953, to T. M. Butler, carrying a vertically disposed row of horizontally extending elongated type elements **18** within a housing **21**. A slot **24** in the base of a housing **21** permits insertion of spring **11** into the type rack **17**. After sliding the spring **11** through the slot **24**, it is anchored with its loop portion **16** enveloped by retaining stud **20**, located near the base of the housing **21**. Each type element **18** is slidably and individually displaceable through slots **25** in parallel spaced support sections **23** in an axial direction relative to the type housing **21**. When the printing hammer **22** is actuated, it strikes the selected type element **18** and forces it toward the printing area including a platen **26**. Printing hammer **22** acts against the restoring force exerted by straight leg **12** of the spring against laterally extending

shoulder portions **19** of the type elements **18**. It should be noted that the loop portion **16** is anchored by retaining stud **20** with clearance provided to allow spring **11** to creep upwardly or downwardly. This permits constant change of the points of impact of the type shoulder **19** against straight leg **12** thereby greatly lessening the possibility of fracture at these points.

In Fig. 3 one of the upper type elements **18** is actuated and the resulting deformation of the spring is shown. Repeated actuation of the upper type elements results in gradual movement of the spring **11** and its stud retaining loop portion **16** downwardly relative to stud **20** leaving clearance between the base of the loop and the stud. This results in the creep previously referred to in connection with Fig. 2 and a resultant enlarged impact area on straight leg **12** for each type element **18**. Spring **11** rocks freely about its central fulcrum **14** of bowed leg **12** which bears against the abutting edge of the housing **21** of type rack **17**.

In Fig. 4 one of the centrally located type elements **18** is actuated and the resulting deformation of the spring is shown. Retaining loop portion **16** is free to move laterally as required around stud **20** until the lower portion of the bowed leg **13** is in limiting abutment against its opposing support section **23**.

In Fig. 5 one of the lower type elements **18** is actuated and the deformation is shown. Repeated actuation of the lower elements results in gradual movement of the stud retaining loop **16** upwardly relative to stud **20** moving the impact points on straight leg **12**, again permitting creep of the spring, however in an upward direction. Spring **11** again rocks freely about its fulcrum section **14** of bowed leg **13** which bears against the abutting edge of support section **23**. In addition, actuation of a lower type element **18** results in free transverse movement of the loop **16** without inhibiting distortion of the spring, thus allowing free transmission of stress around the substantially free floating loop **16** of the spring.

It is readily apparent that the spring design permits direct insertion into the fully assembled type rack assembly with attendant ease of replacement and a minimum of preload stress. The symmetrical bend of bowed leg portion **13** provides substantially uniform tension along the entire length of straight leg portion **12**. When a deflecting force is applied the spring is itself deflected over substantially the same linear length regardless of where on straight leg **12** the force is applied.

The shape of bowed leg **13** with its central fulcrum section **14** together with its free floating fulcrumed position against the wall of housing **21** permits free transmission of stresses around the loop portion to permit both its end portions to contribute substantially their entire length to share the spring load. In addition, the substantially uniform linear flexure of the spring in bowed leg **13** provides a restoring tension along the straight leg **12** that is exceedingly uniform regardless of which type element is actuated. It should be noted that with creep clearance allowed about the stud **20** the spring is not stressed at the same point as different type elements **18** are actuated. In addition, the stress provided upon straight leg **12** by bowed leg **13** where they slidably bear together near their free terminals operates with a dampening effect on the vibrations of straight leg **12** after hammer **22** has actuated a type element and been withdrawn. This greatly reduced period of vibration for the straight leg naturally lessens the possibility of fracture of the spring.

Particular attention should be directed to the structural characteristics of the loop **16**. In the mounted condition of the spring (Fig. 2) the loop envelops the stud **16**. The dimension of the loop in a transverse direction is larger than the distance between the spaced support sec-

tions 23. This factor, in combination with the location of the stud 20 below and near the support section upon which the bowed leg portion abuts, permits free displacement of the impacted portion of the spring, more specifically the straight leg portion over substantially the entire width of the housing 21. While the stud performs its function of retaining the spring within the mounting, it does not securely anchor the spring in such a manner that stresses cannot be freely transmitted around the loop. The anchoring portion of the spring, the loop portion, is deformable outside and beyond the limits of the housing.

The above factors, together with others previously indicated, appreciably reduce fatigue and flexure type stresses, thereby assuming prolonged service life and virtual elimination of spring break-down and replacement problems.

What is claimed is:

1. In a type rack having a housing, a plurality of transversely movable elongated type elements mounted in said housing, and a biasing spring for restraining said elements against displacement, said spring comprising a normally straight leg portion having a free terminal, a bowed leg portion having a free terminal and a central fulcrum section of substantially constant curvature, and a loop portion joining said straight leg portion and said bowed leg portion, said leg portions in constant slidable abutment proximate said free terminals, said straight leg portion engaging a portion of each of said type elements, and said bowed portion bearing with said central fulcrum section against the inside surface of said housing.

2. In a type rack including a housing having a pair of spaced support sections, a plurality of elongated type elements extending transversely from and mounted between said support sections, a spring retaining stud mounted on said type rack outside and proximate said housing, and a spring, said spring comprising a straight leg portion extending transversely of and engaging a portion of each of said type elements adjacent one of said spaced support sections, and having a free terminal, a bowed leg portion normally in compression having a free terminal in constant engagement with said free terminal of said straight leg portion near the end of said type rack opposite the retaining stud end thereof and an arcuately bent central fulcrum section of substantially constant curvature displaced from said straight leg portion and engaging the other one of said spaced support sections of said housing, and a loop portion joining said straight leg portion and said bowed leg portion and extending in a direction substantially normal to said straight leg portion, said loop portion being received on said retaining stud and having a dimension in the direction of the length of the spring substantially greater than the dimension of said stud and having a dimension in a transverse direction several times greater than the dimension of said stud.

3. In a type rack including a housing having a pair of spaced support sections, a plurality of elongated type elements extending transversely from and mounted between said support sections being movable in substantially parallel paths and in the same direction, a spring retaining stud mounted on said type rack outside said housing and a spring, said spring comprising a straight leg portion extending transversely of and engaging a portion of each of said type elements adjacent one of said spaced support sections and having a free terminal, a bowed leg portion having a free terminal in constant engagement with said straight leg portion proximate said free terminal thereof near the end of said housing farthest from said retaining stud and an arcuately bent central fulcrum section of substantially constant curvature displaced from said straight leg portion and engaging the other one of said spaced support sections of said housing, and a loop portion joining said straight leg portion and said bowed leg portion and extending transversely to said straight leg portion in its normal, unactuated position and in the direction of movement of said type elements, said loop portion being received on said retaining stud and having a dimension in the direction of the length of said spring substantially greater than the dimension of the said stud and having a dimension in a transverse direction to the length of said spring several times greater than the dimension of said stud, said dimension in a transverse direction being greater than the distance between said spaced support sections.

4. In a type rack including a housing having a pair of spaced support sections, a plurality of elongated type elements extending transversely from and mounted between said support sections being movable in substantially parallel paths and in the same direction, a spring retaining stud mounted on said type rack outside said housing and a spring, said spring comprising a straight leg portion extending transversely of and engaging a portion of each of said type elements adjacent one of said spaced support sections and having a free terminal, a bowed leg portion normally in a state of compression having a free terminal bearing against said straight leg portion proximate said free terminal thereof near the end of said housing furthest from said retaining stud and an arcuately bent central fulcrum section of constant curvature displaced from said straight leg portion and engaging the other one of said spaced support sections of said housing, and a loop portion joining said straight leg portion and said bowed leg portion and extending in a direction substantially normal to said straight leg portion in its normal position and in the direction of movement of said type elements, said loop portion being received on said retaining stud, said stud being mounted adjacent said spaced support section engaged by said bowed leg portion, and said loop portion having a dimension in the direction of the length of said spring substantially greater than the dimension of said stud and having a dimension in the transverse direction to the length of said spring several times greater than the dimension of said stud.

5. In a type rack having a housing, including a pair of spaced support sections, a plurality of transversely movable elongated type elements mounted between said support sections, a stud mounted on said type rack, and a spring for restraining said elements against displacement, said spring comprising a normally straight leg portion engaging a portion of each of said type elements, a bowed leg portion, a loop portion joining said straight leg portion and said bowed leg portion, said looped portion enveloping said stud and being elongated transversely of said spring a distance greater than the spacing between said spaced support sections.

6. In a type rack having a housing, a plurality of transversely movable elongated type elements mounted in said housing, and a biasing spring for restraining said elements against displacement, said spring comprising a normally straight deflection member having a free terminal, a vibration dampening member of curved configuration having a free terminal and a central fulcrum section of substantially constant curvature, and a loop portion joining said deflection member and said vibration dampening member, said deflection member and said vibration dampening member being in constant engagement proximate their said free terminals, said deflection member engaging a portion of each of said type elements, and said vibration dampening member bearing with said central fulcrum section against the inner planar surface of said housing.

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